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# DATA BASE FOR LIGHT-WEIGHT AUTOMOTIVE DIESEL POWER PLANTS
## Volume III: Miscellaneous Data

B. Wiedemann, R. Schmidt, et al.
Volkswagenwerk
Research Division
3180 Wolfsburg
Federal Republic of Germany

1979
FINAL REPORT

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Prepared for

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
Office of Passenger Vehicle Research
Washington DC 20590

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16. Abstract

The effects of fuel economy, emissions, passenger car safety and other variables due to the installation of light-weight Diesel powerplants were studied. Experimental data was obtained on naturally aspirated and turbocharged Diesel engines installed in subcompact and compact passenger vehicles. The data includes fuel economy as a function of engine type and horsepower, as a function of vehicle inertia weight and as a function of regulated emission constraints. Unregulated emissions have been characterized during the course of the work. The compatibility of the Diesel engine studied with passenger car structures incorporating advanced frontal crashworthiness capabilities was also verified.

The report consists of three volumes. Volume I, the Executive Summary, presents a summary of the data obtained and a review of the important conclusions. Volume II, the main body of the report, provides a discussion of the fuel economy and emissions obtained, a description of the engine/vehicle systems tested and the results of factory driveability tests. Volume III, the appendixes, presents miscellaneous data used during the program.

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Diesels, CI-Engines, Passenger Cars, Fuel economy, Safety, Emissions, Automobiles

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# PREFACE

In support of the National Highway Traffic Safety Administration, Office of Passenger Vehicle Research, the Department of Transportation-Transportation Systems Center contracted with Volkswagenwerk AG, Federal Republic of Germany to develop a data base on light-weight Diesel engines suitable for passenger cars. Volkswagen research, pre-production and production Diesel engines were used for the test portion of the work and for the 'analytical extrapolation.'

A Volkswagen research vehicle with advanced crashworthiness characteristics was provided by Volkswagen to demonstrate and document compatibility with an advanced diesel engine design (Integrated Research Vehicle). Through the effort the Diesel engines were evaluated in the context of an integrated vehicle system with the aspects of fuel economy, environment, consumer requirements and cost in mind.

The authors wish to acknowledge the guidance provided by Mr. H.Gould and Dr.R.John of the Department of Transportation-Transportation Systems Center and Dr. K. Digges of the Department of Transportation-National Highway Traffic Safety Administration.

Our working team consisted of the following persons:
Miss C. Schwarz, Messrs. R. Graupmann, W. Lange, K.-J. Lemke, H. Leptien, Dr. G. W. Schweimer and M. Willmann.

They were supported by:
Miss J. Dommschack and Messrs. H.-D. Beckmann, P. M. Deja, P. Jirousek, W. Kiegeland, W. Kurpiers, Dr. K.-H. Lies, J. Nitz, E. Pommer, K.-H. Schneider and P. Seifert together with members of the staff from the VW prototype shop, the VW transmission development department and the VW measuring and testing department.

# METRIC CONVERSION FACTORS

## Approximate Conversions to Metric Measures

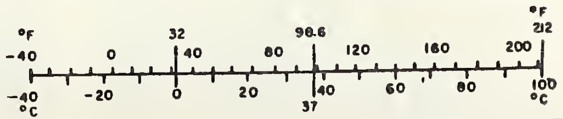
| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | | **LENGTH** | | |
| in | inches | *2.5 | centimeters | cm |
| ft | feet | 30 | centimeters | cm |
| yd | yards | 0.9 | meters | m |
| mi | miles | 1.6 | kilometers | km |
| | | **AREA** | | |
| $in^2$ | square inches | 6.5 | square centimeters | $cm^2$ |
| $ft^2$ | square feet | 0.09 | square meters | $m^2$ |
| $yd^2$ | square yards | 0.8 | square meters | $m^2$ |
| $mi^2$ | square miles | 2.6 | square kilometers | $km^2$ |
| | acres | 0.4 | hectares | ha |
| | | **MASS (weight)** | | |
| oz | ounces | 28 | grams | g |
| lb | pounds | 0.45 | kilograms | kg |
| | short tons (2000 lb) | 0.9 | tonnes | t |
| | | **VOLUME** | | |
| tsp | teaspoons | 5 | milliliters | ml |
| Tbsp | tablespoons | 15 | milliliters | ml |
| fl oz | fluid ounces | 30 | milliliters | ml |
| c | cups | 0.24 | liters | l |
| pt | pints | 0.47 | liters | l |
| qt | quarts | 0.95 | liters | l |
| gal | gallons | 3.8 | liters | l |
| $ft^3$ | cubic feet | 0.03 | cubic meters | $m^3$ |
| $yd^3$ | cubic yards | 0.76 | cubic meters | $m^3$ |
| | | **TEMPERATURE (exact)** | | |
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |

---

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

## Approximate Conversions from Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | | **LENGTH** | | |
| mm | millimeters | 0.04 | inches | in |
| cm | centimeters | 0.4 | inches | in |
| m | meters | 3.3 | feet | ft |
| m | meters | 1.1 | yards | yd |
| km | kilometers | 0.6 | miles | mi |
| | | **AREA** | | |
| $cm^2$ | square centimeters | 0.16 | square inches | $in^2$ |
| $m^2$ | square meters | 1.2 | square yards | $yd^2$ |
| $km^2$ | square kilometers | 0.4 | square miles | $mi^2$ |
| ha | hectares (10,000 $m^2$) | 2.5 | acres | |
| | | **MASS (weight)** | | |
| g | grams | 0.035 | ounces | oz |
| kg | kilograms | 2.2 | pounds | lb |
| t | tonnes (1000 kg) | 1.1 | short tons | |
| | | **VOLUME** | | |
| ml | milliliters | 0.03 | fluid ounces | fl oz |
| l | liters | 2.1 | pints | pt |
| l | liters | 1.06 | quarts | qt |
| l | liters | 0.26 | gallons | gal |
| $m^3$ | cubic meters | 35 | cubic feet | $ft^3$ |
| $m^3$ | cubic meters | 1.3 | cubic yards | $yd^3$ |
| | | **TEMPERATURE (exact)** | | |
| °C | Celsius temperature | 9/5 (then add 32) | Fahrenheit temperature | °F |



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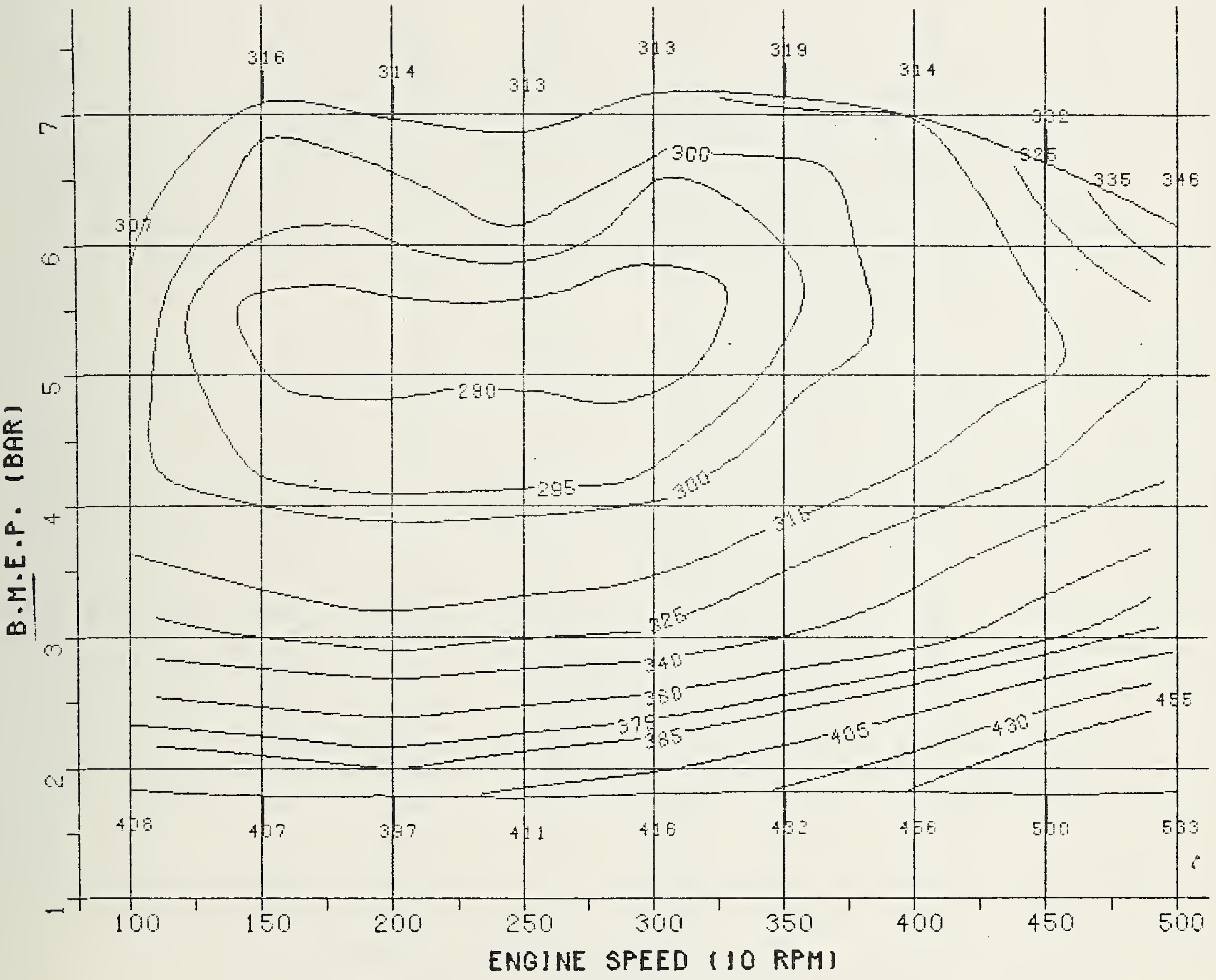
# APPENDIX A

# MISCELLANEOUS DATA



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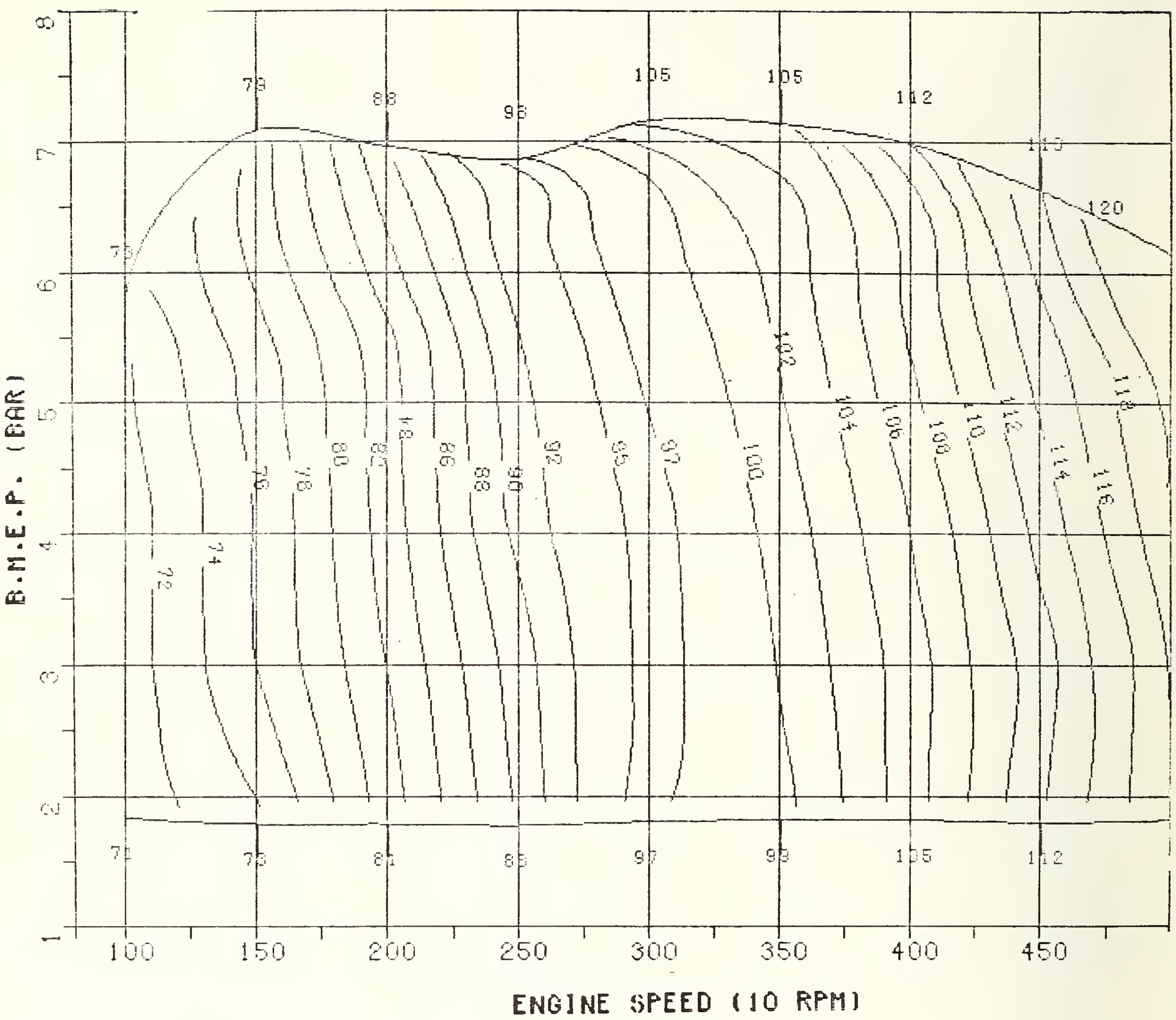

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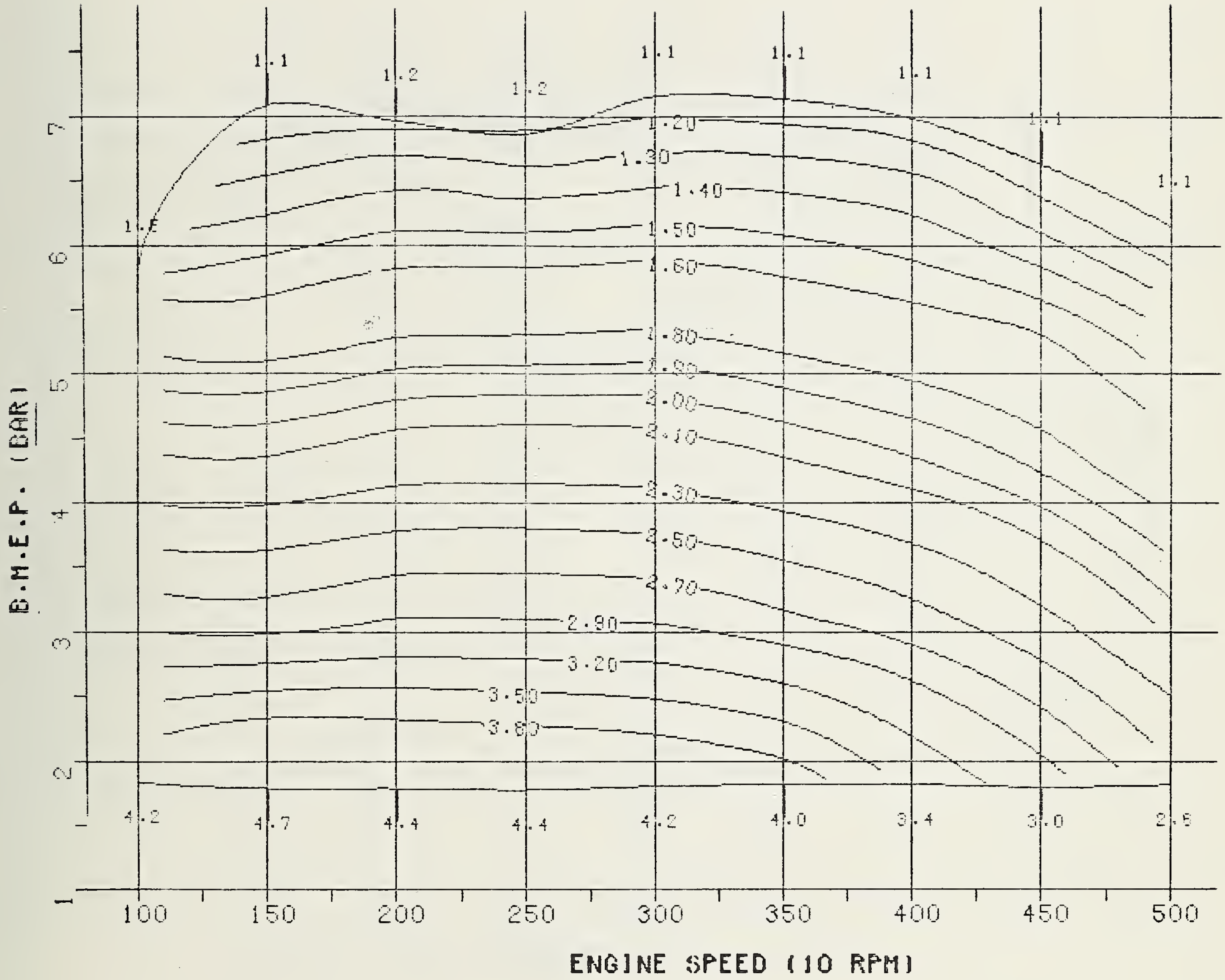

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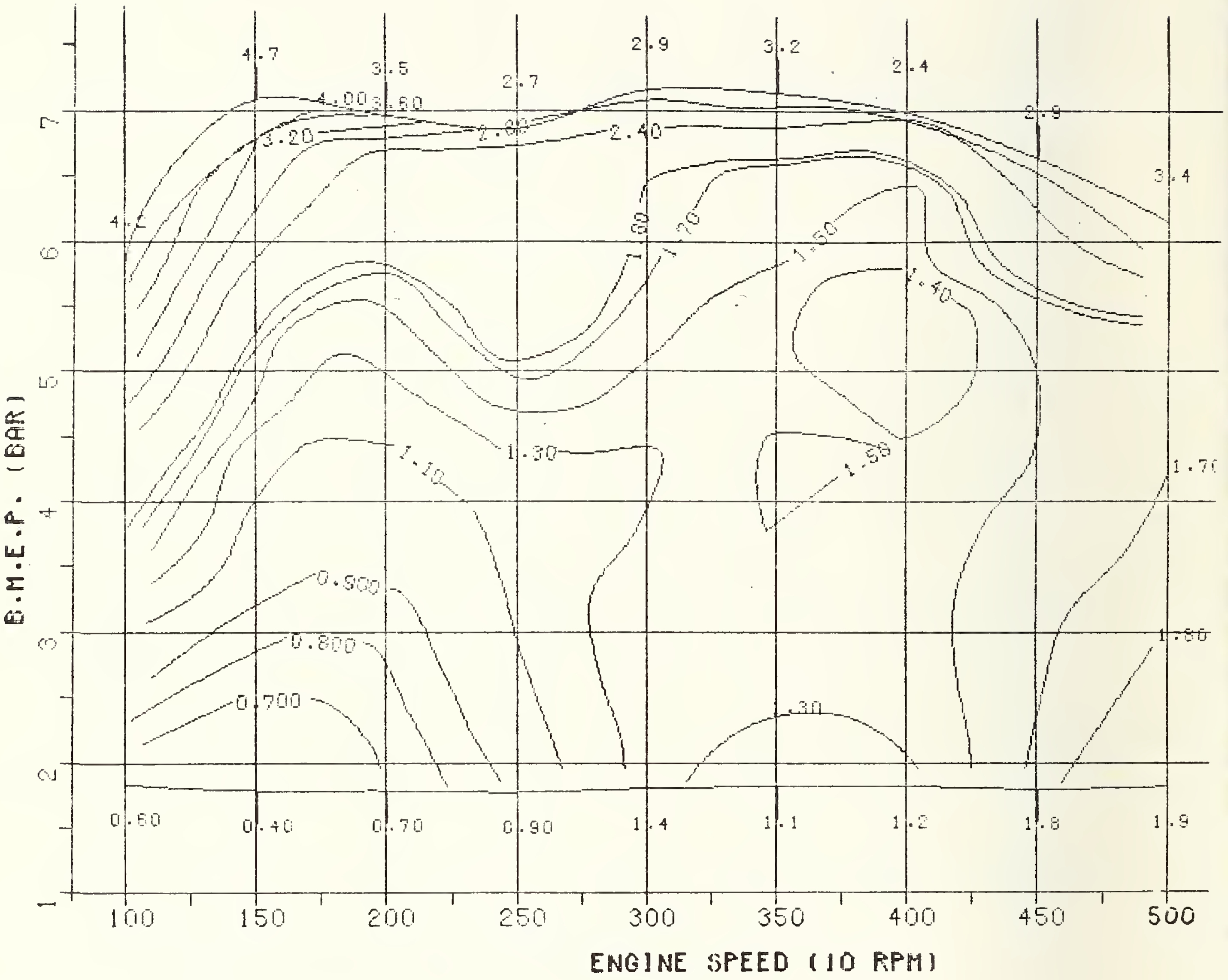
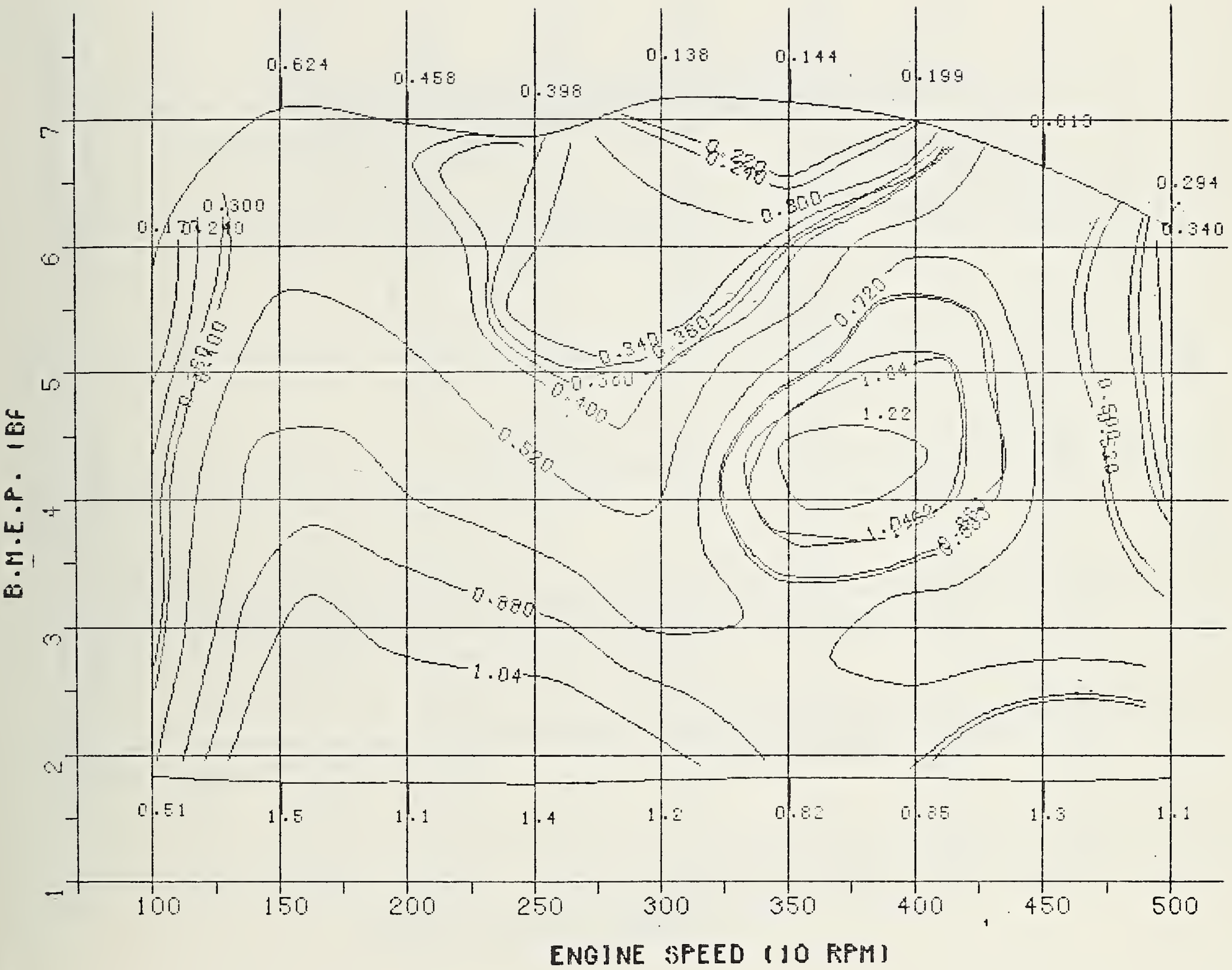
50 HP N.A. 90 CID PRODUCTION DIESEL ENGINE



SMOKE (BOSCH NUMBER)
50 HP N.A. 90 CID PRODUCTION DIESEL ENGINE



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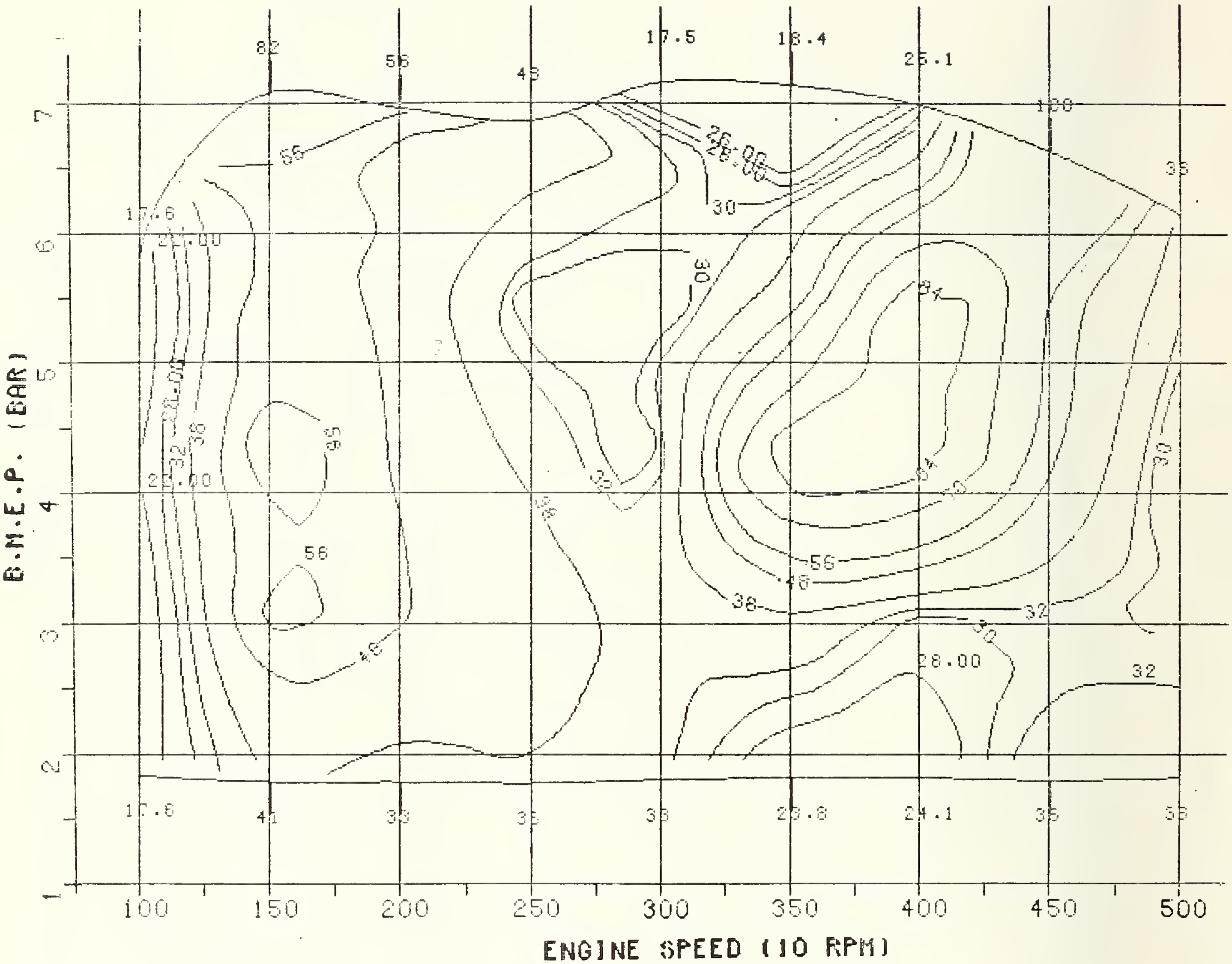

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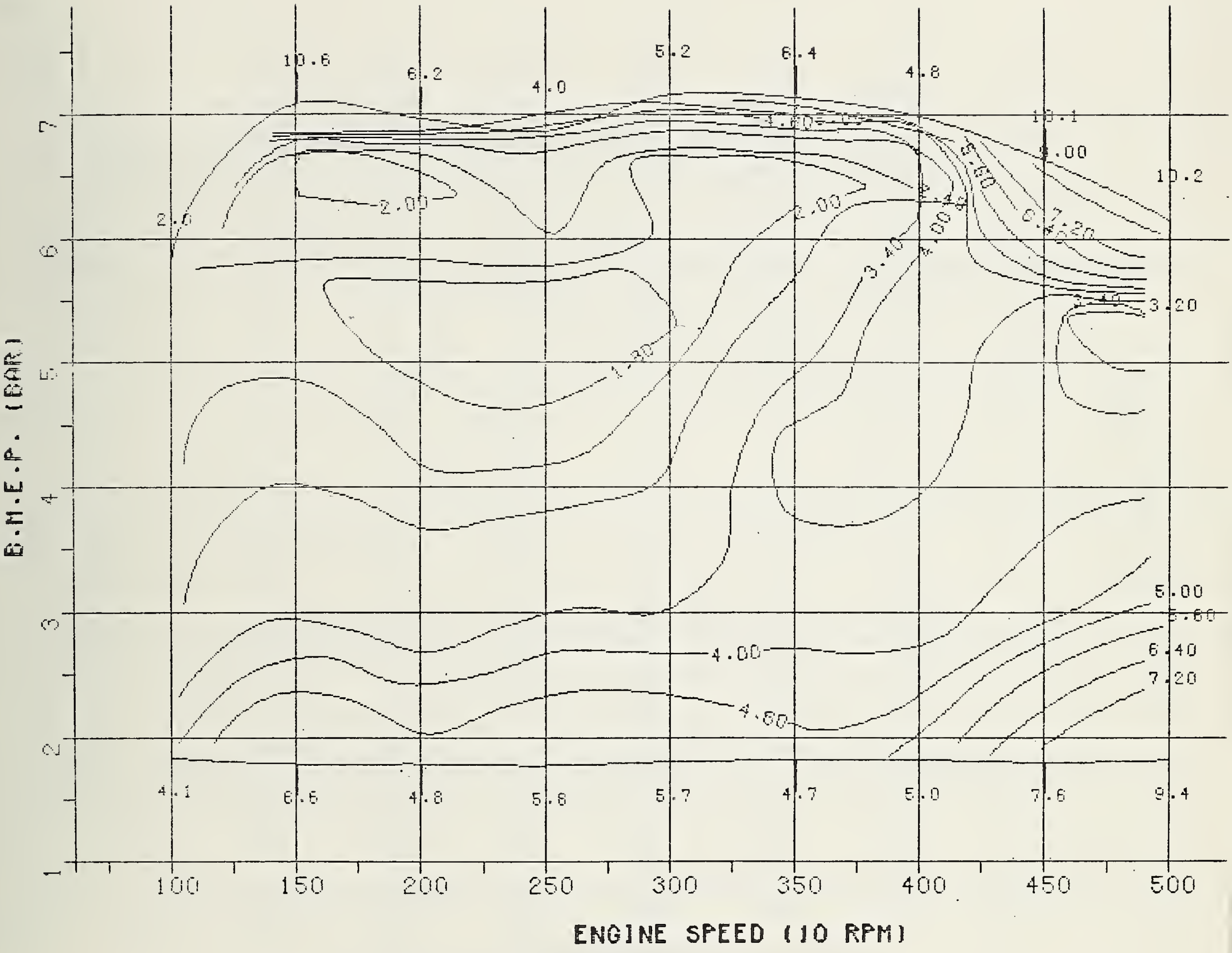

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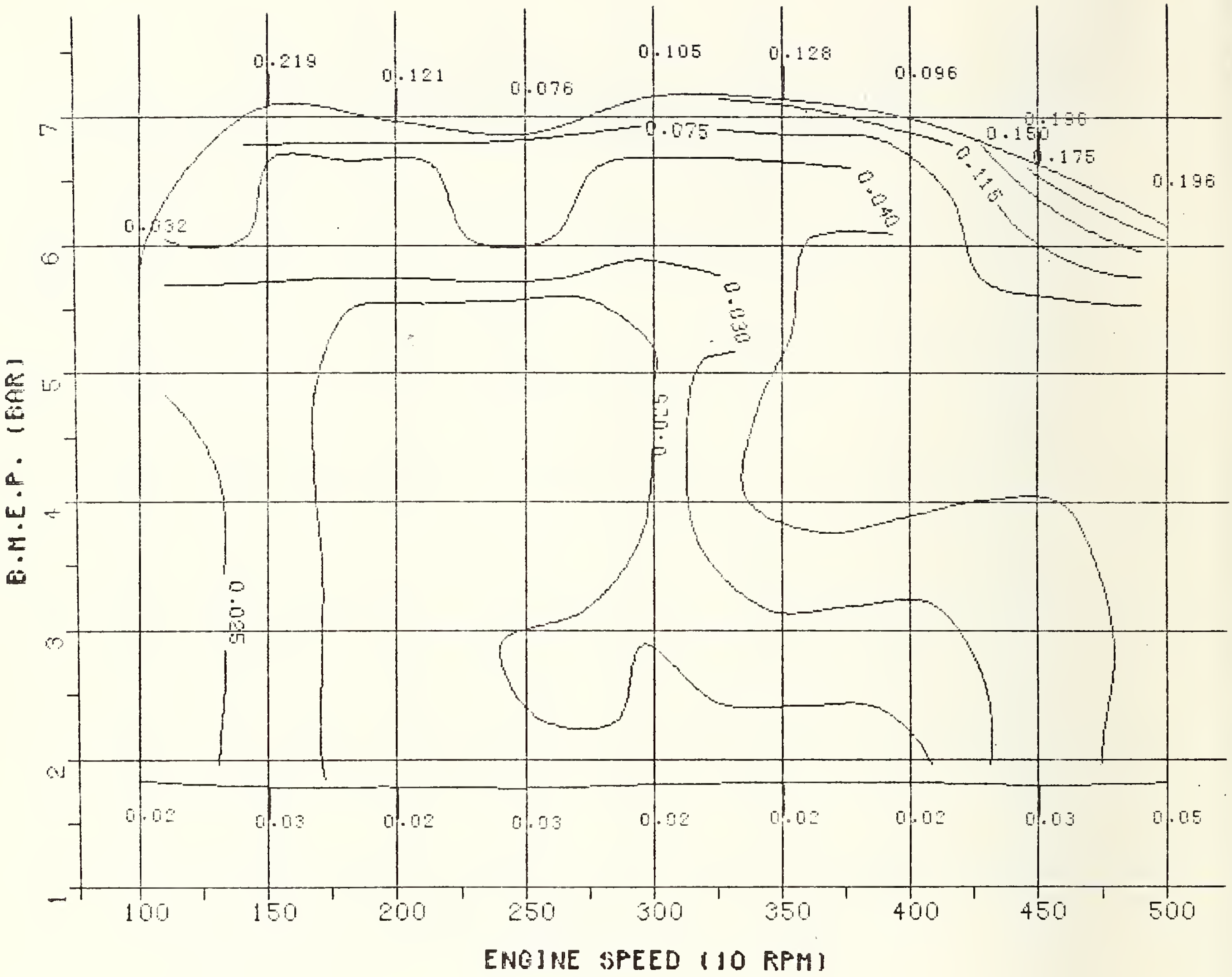

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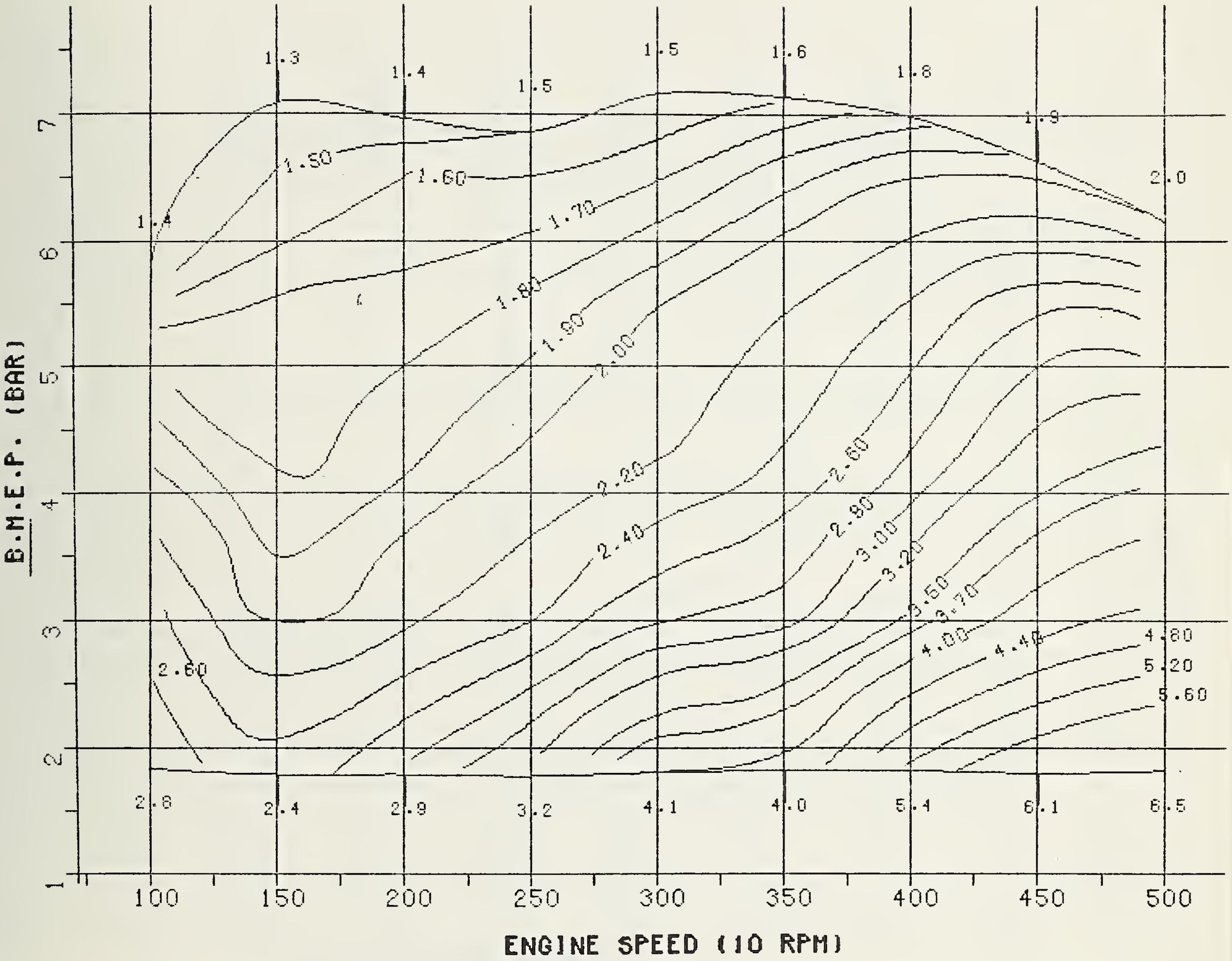

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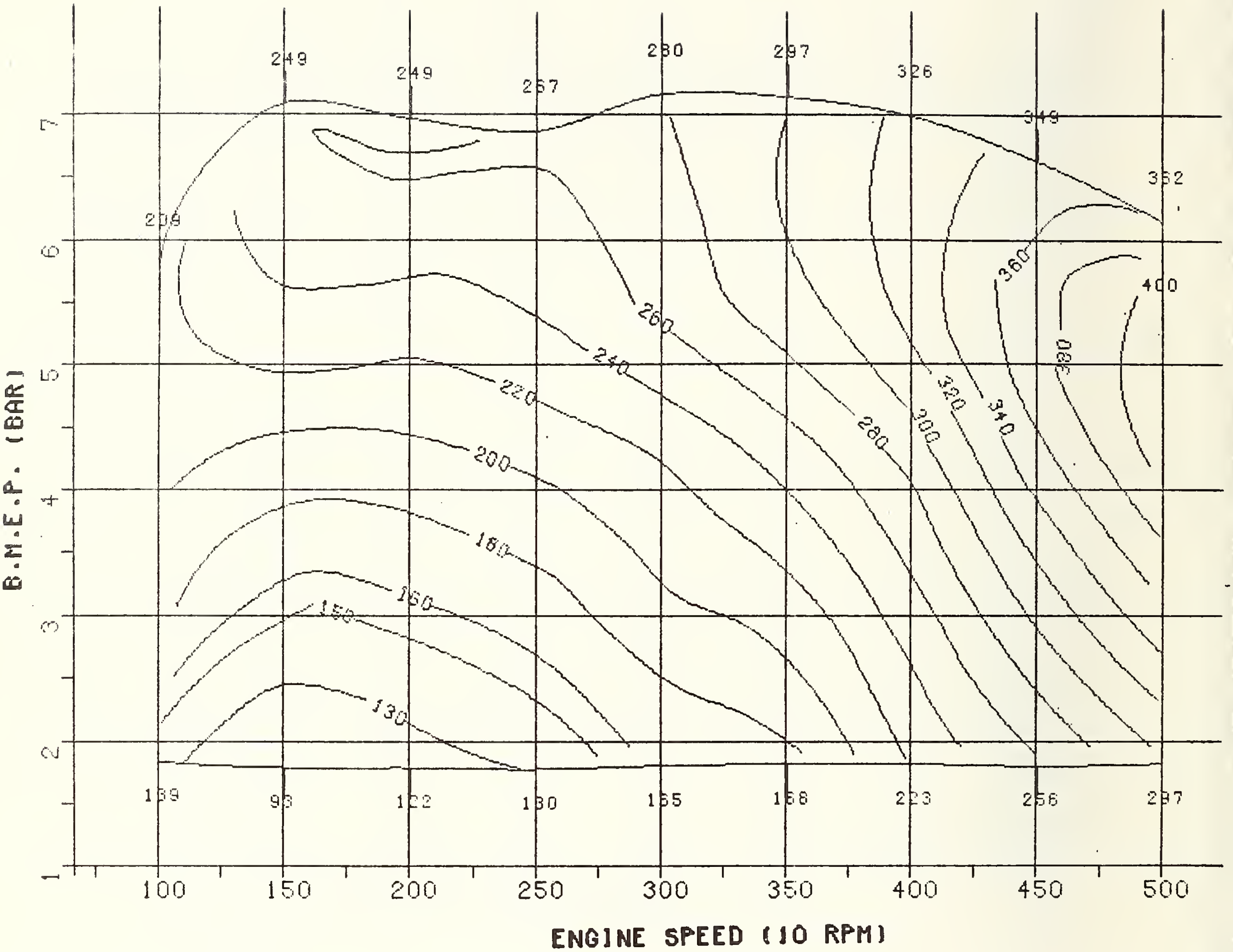

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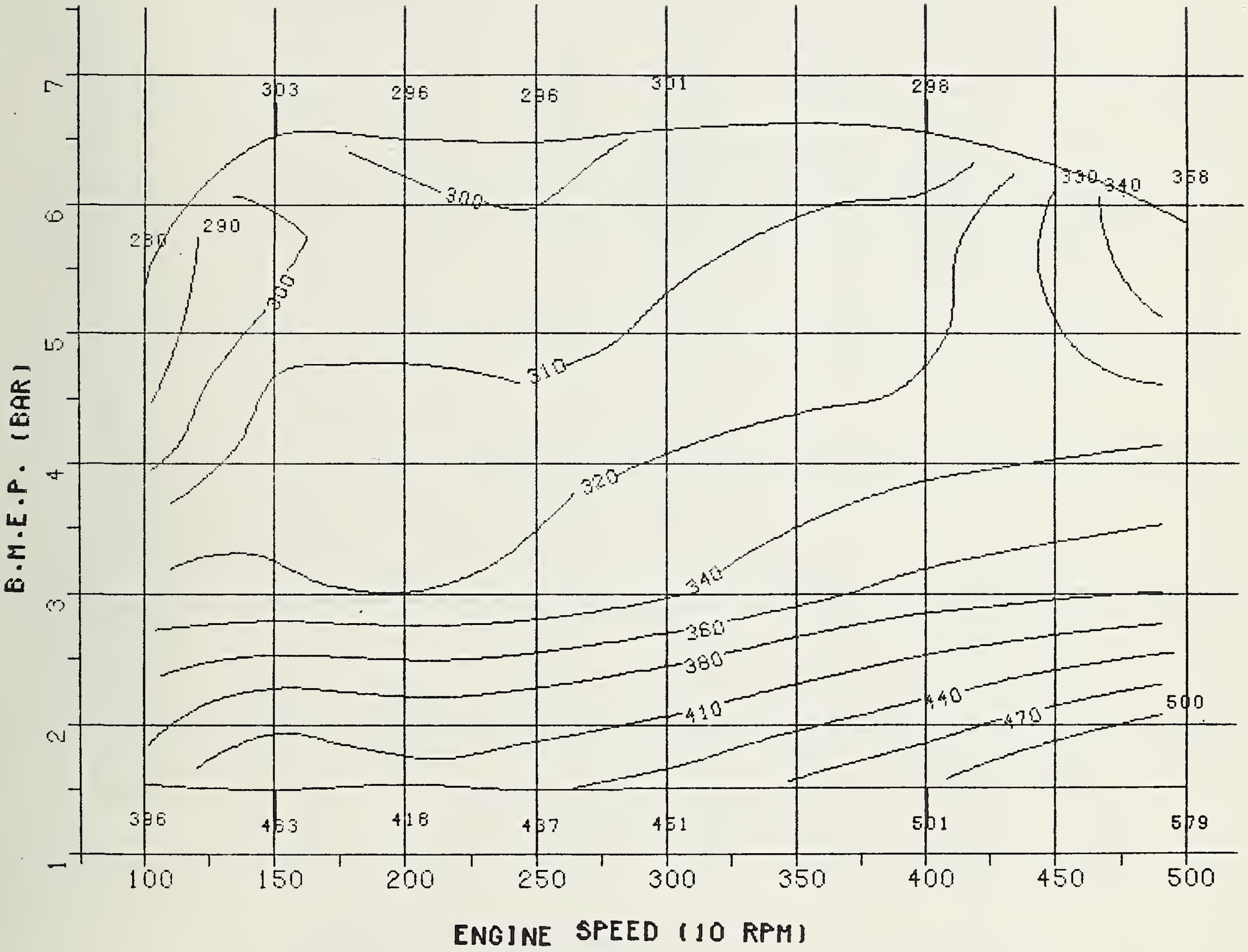

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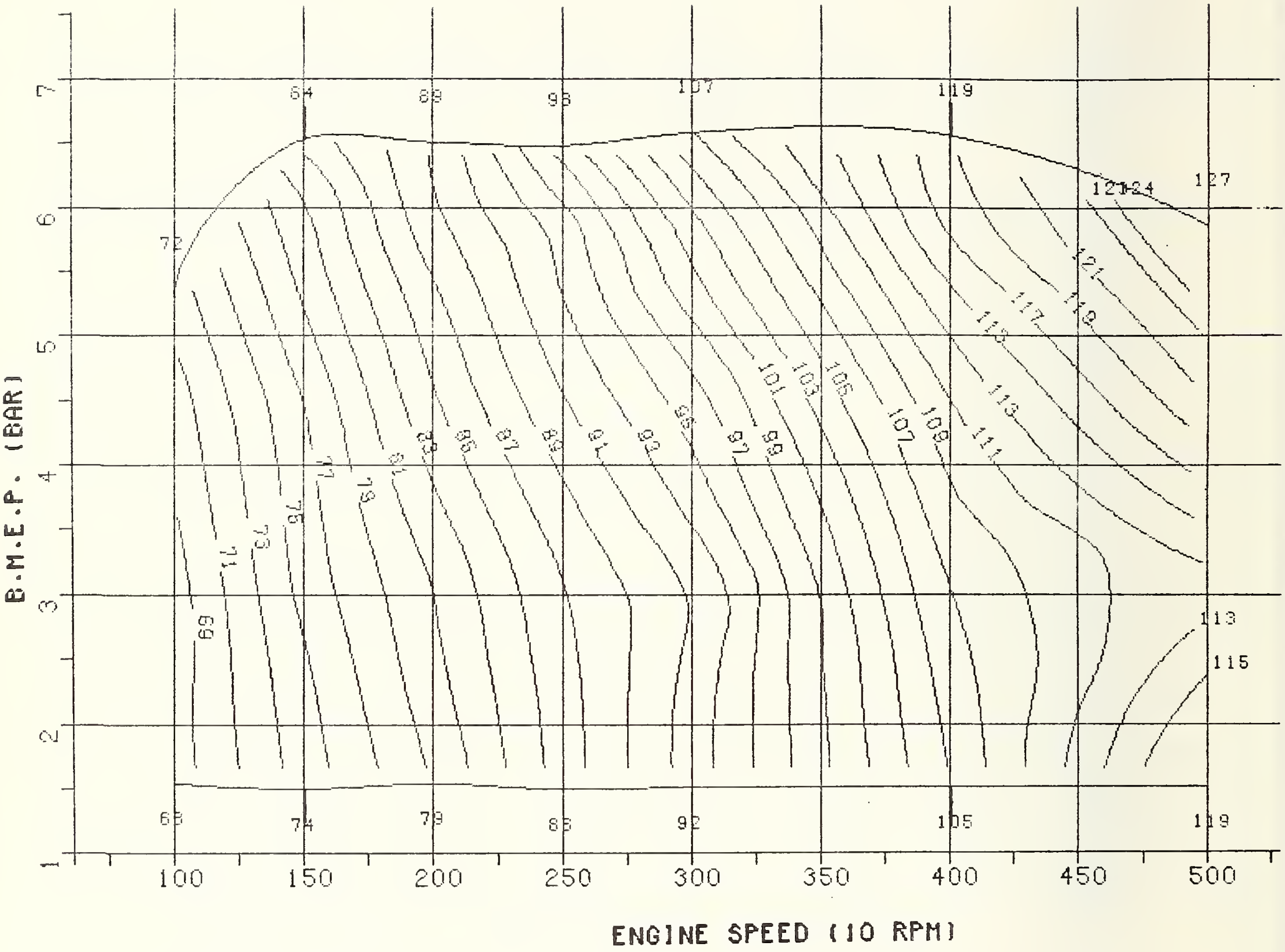

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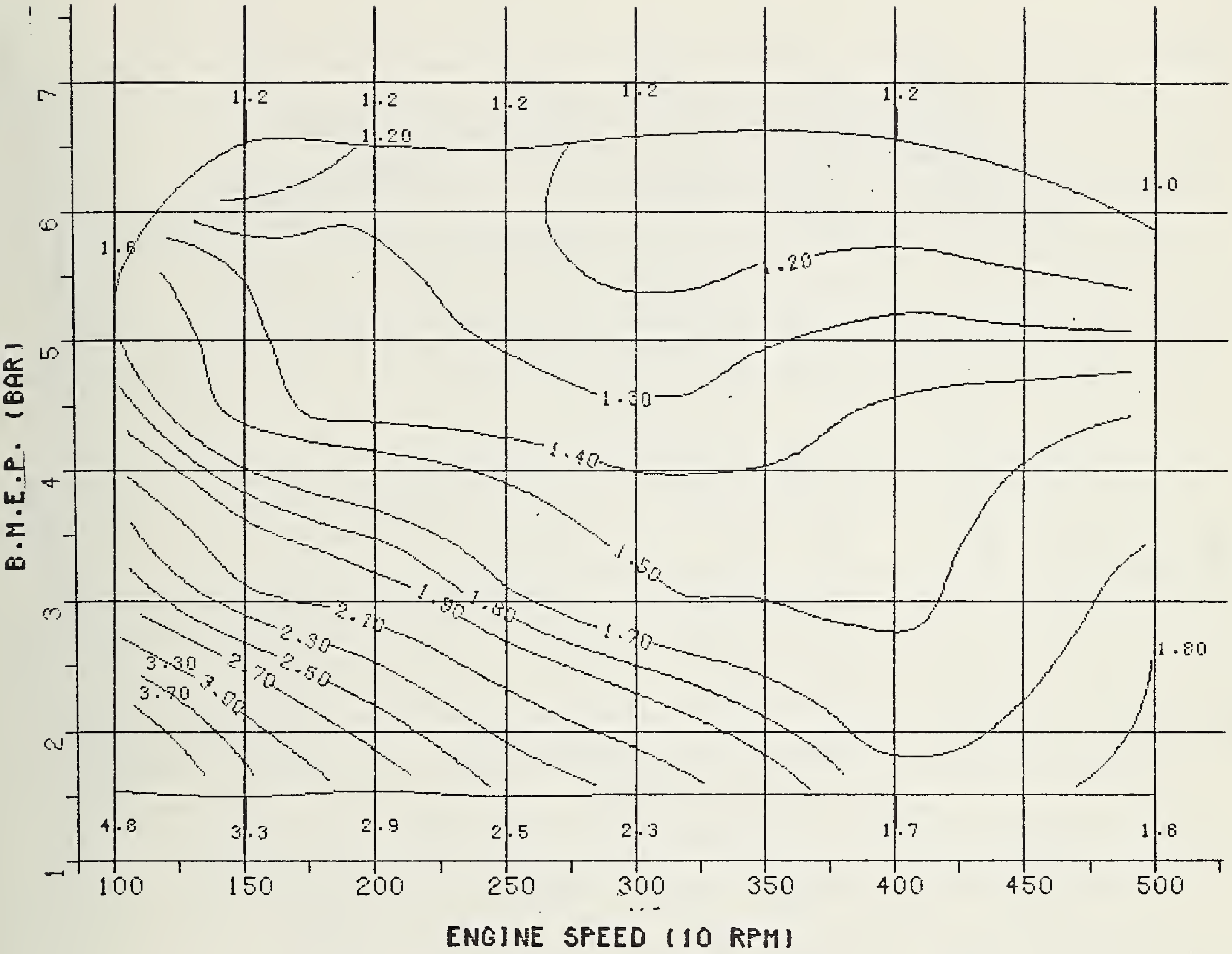

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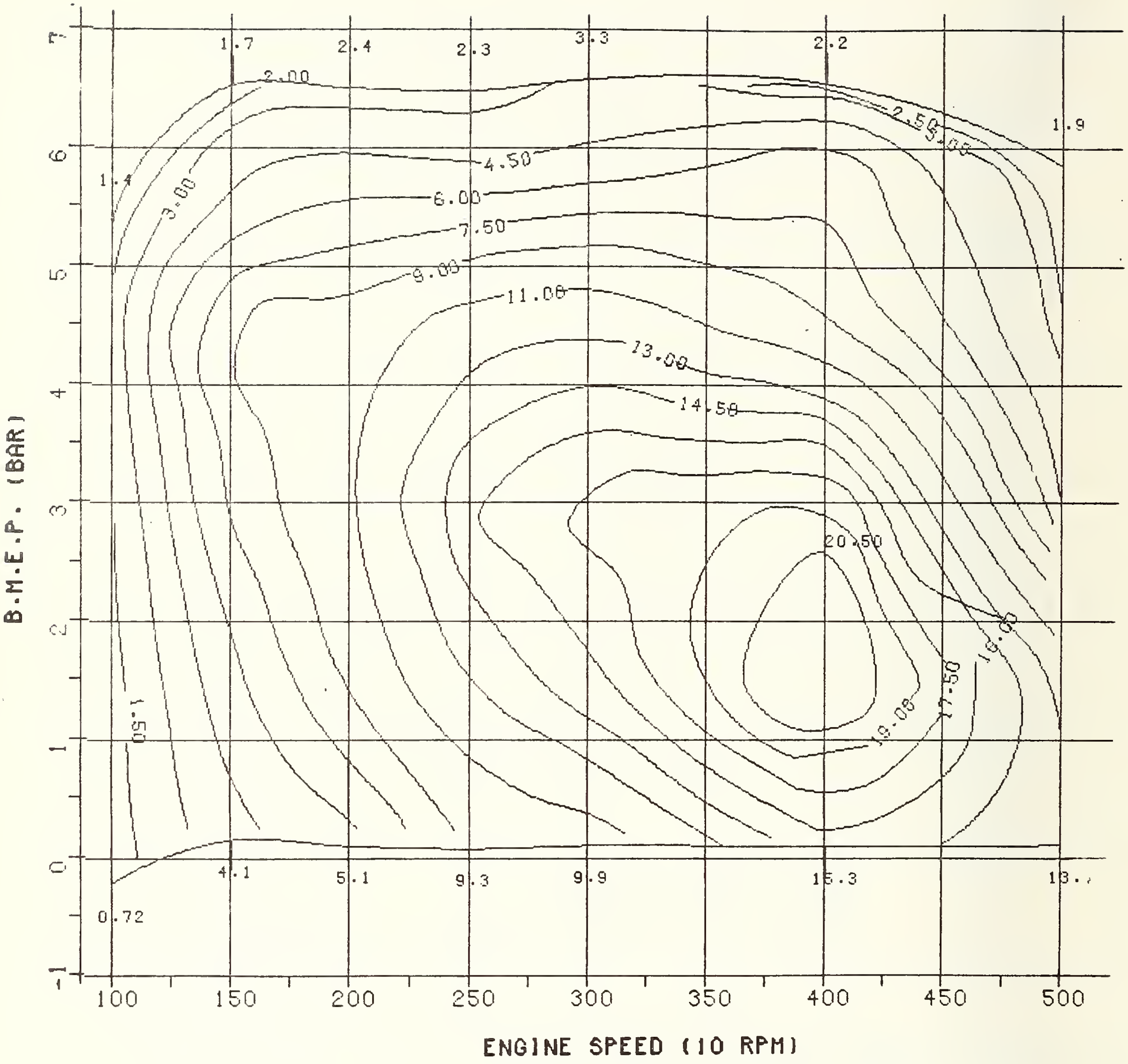

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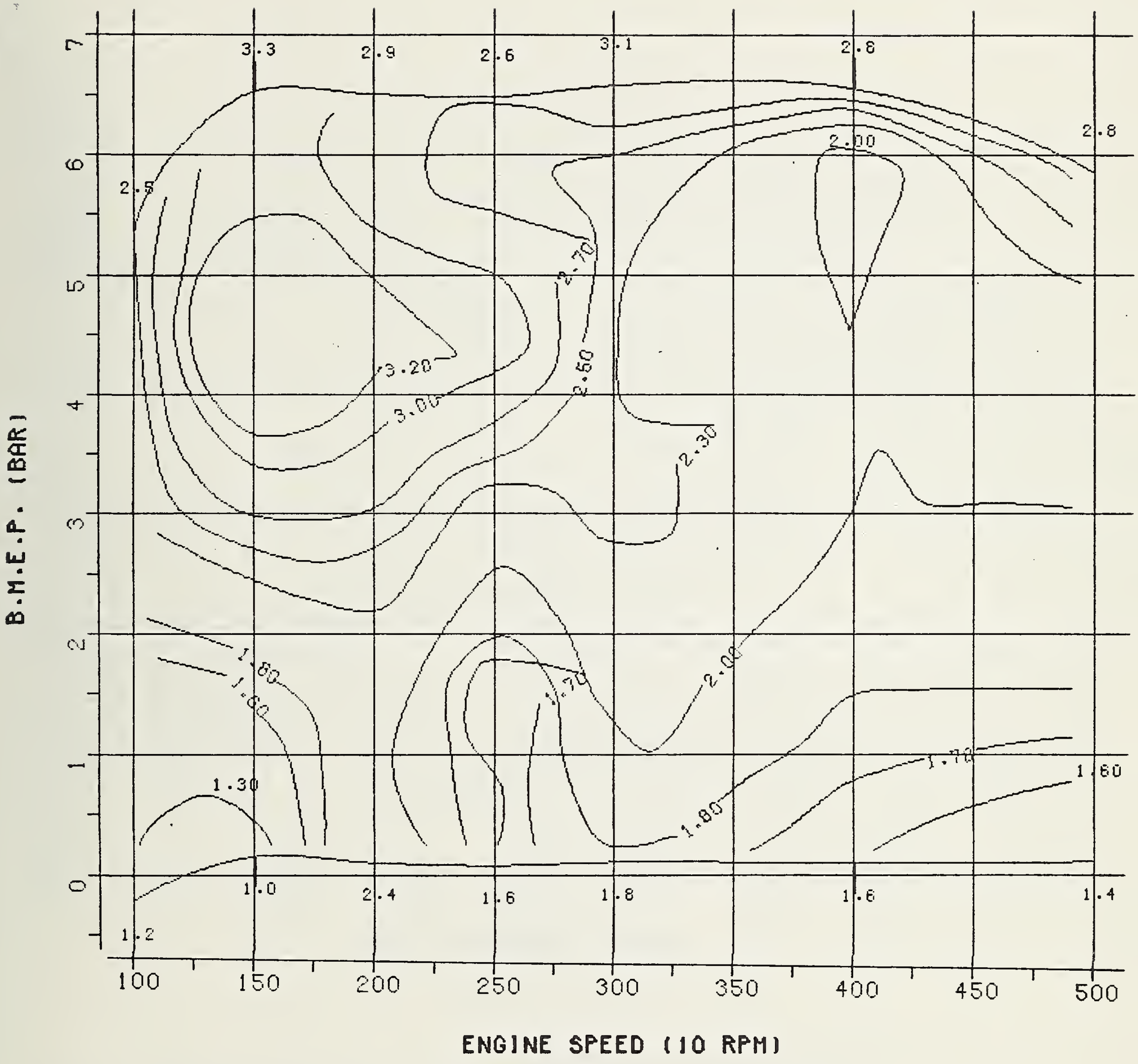

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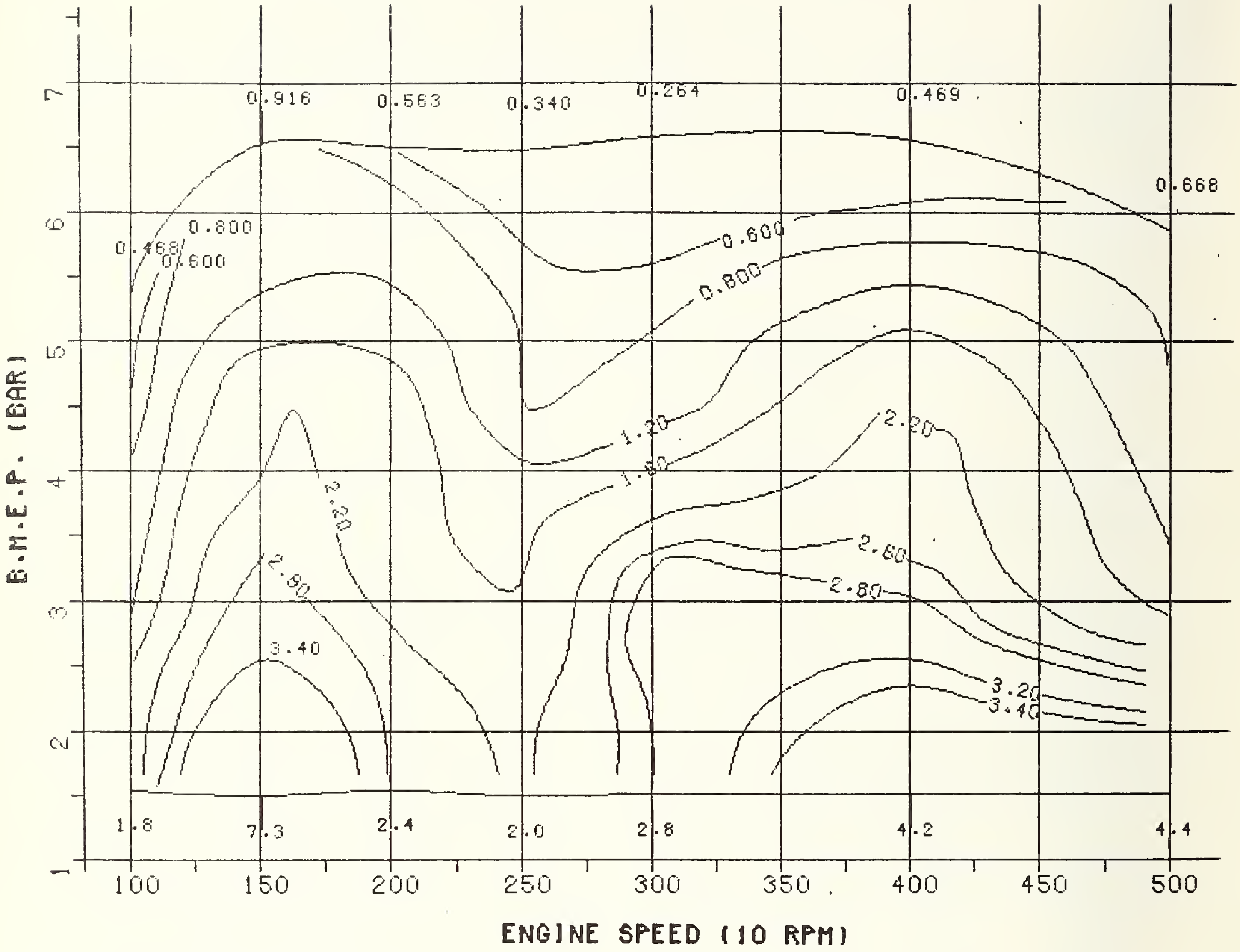

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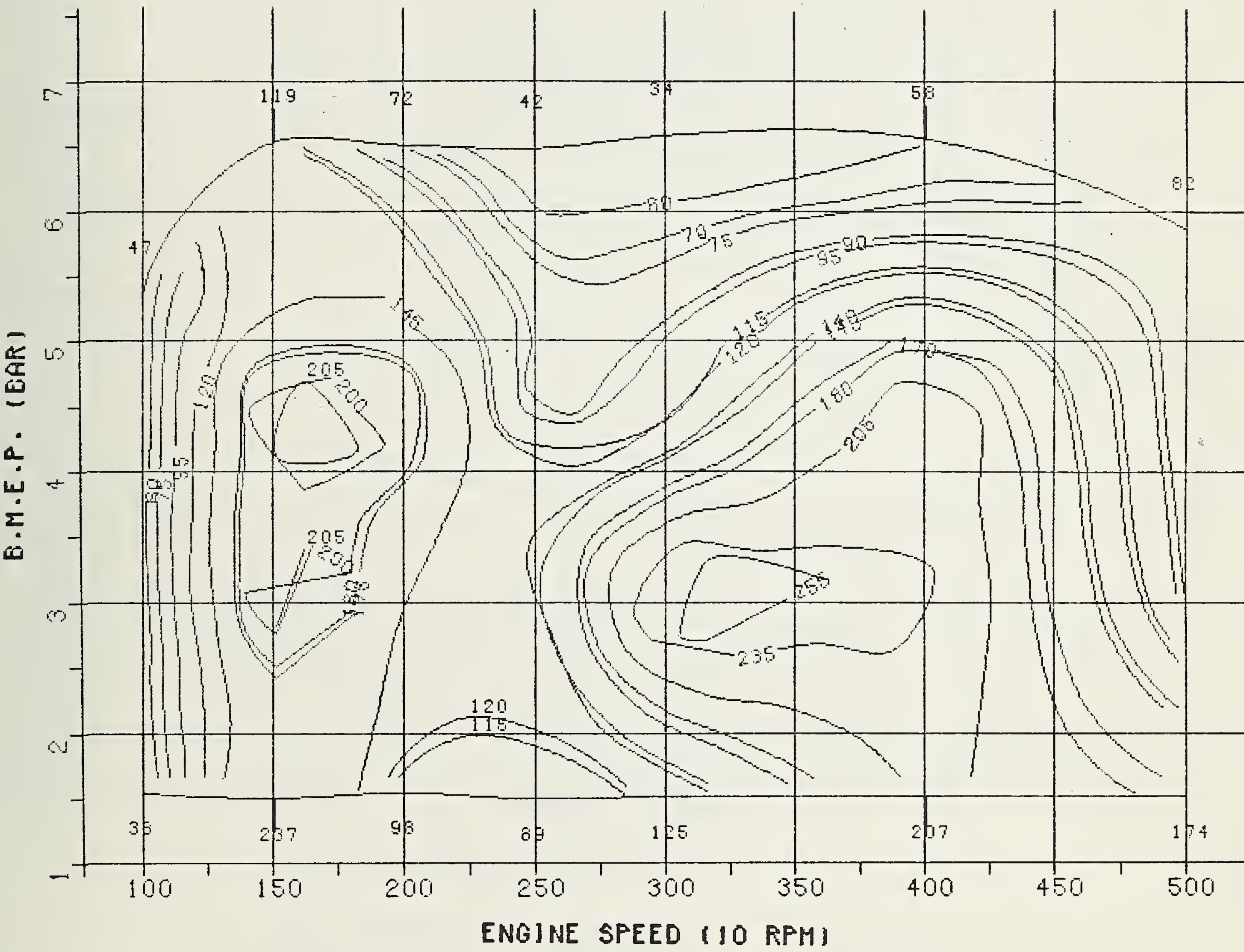

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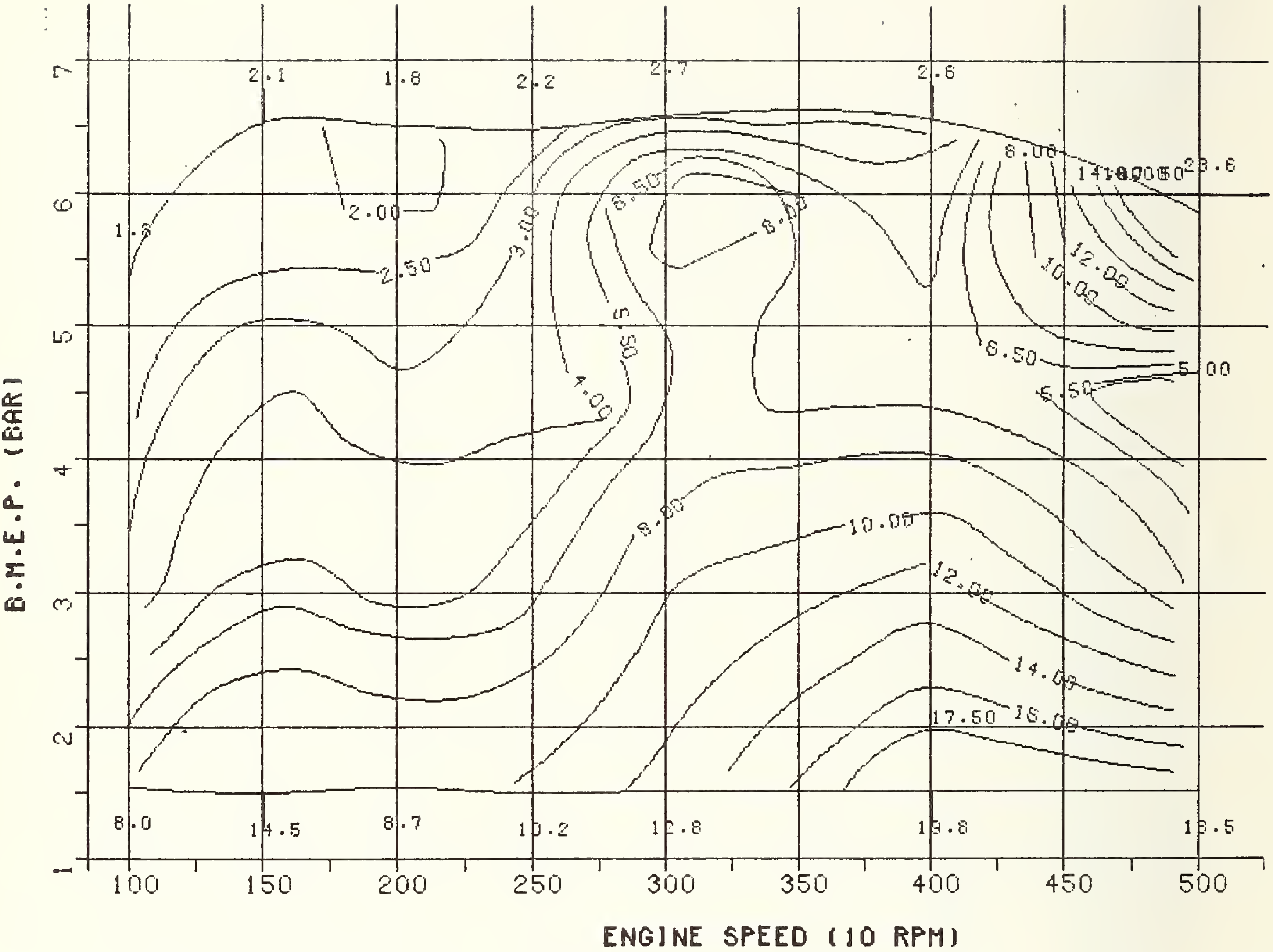

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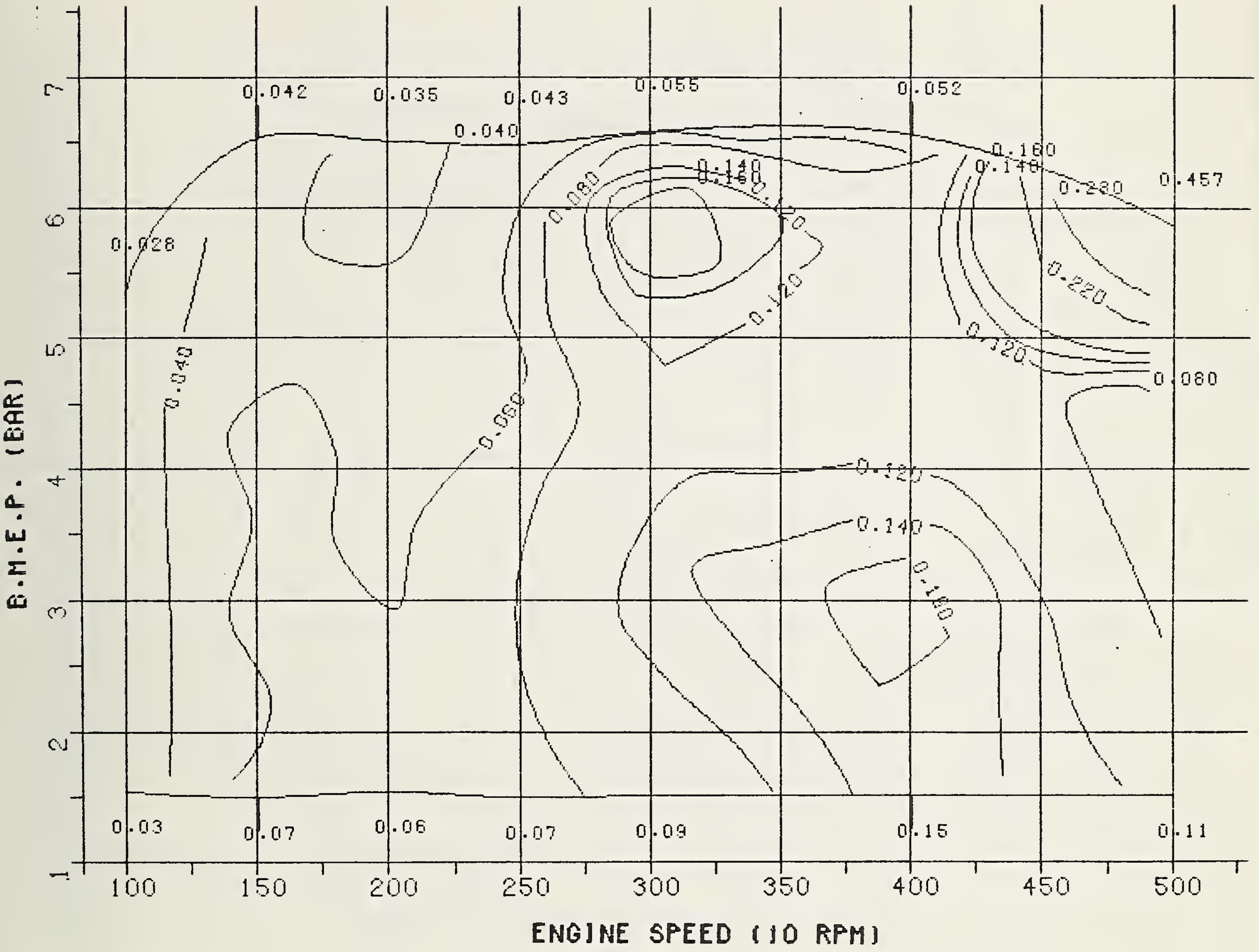

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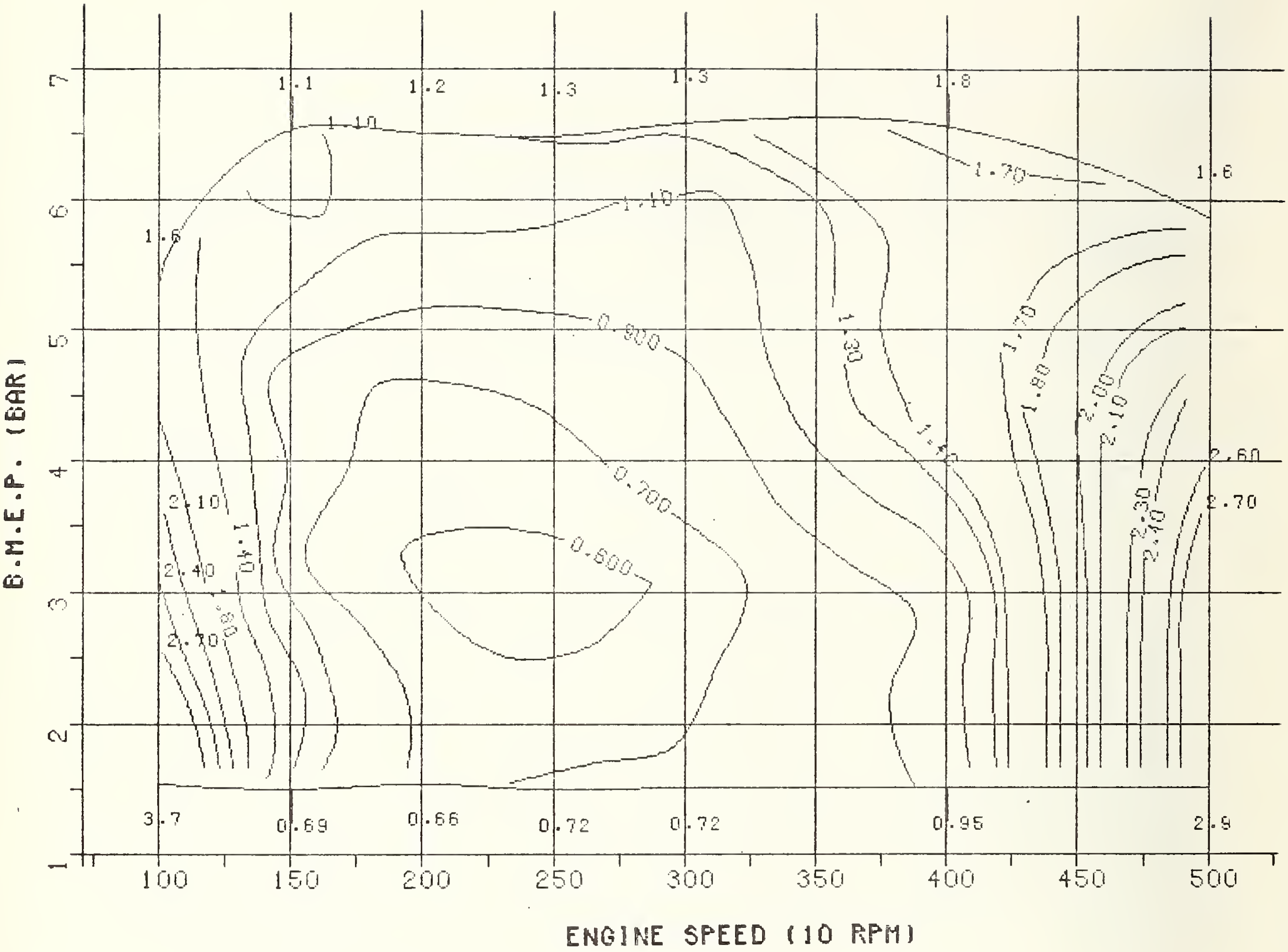

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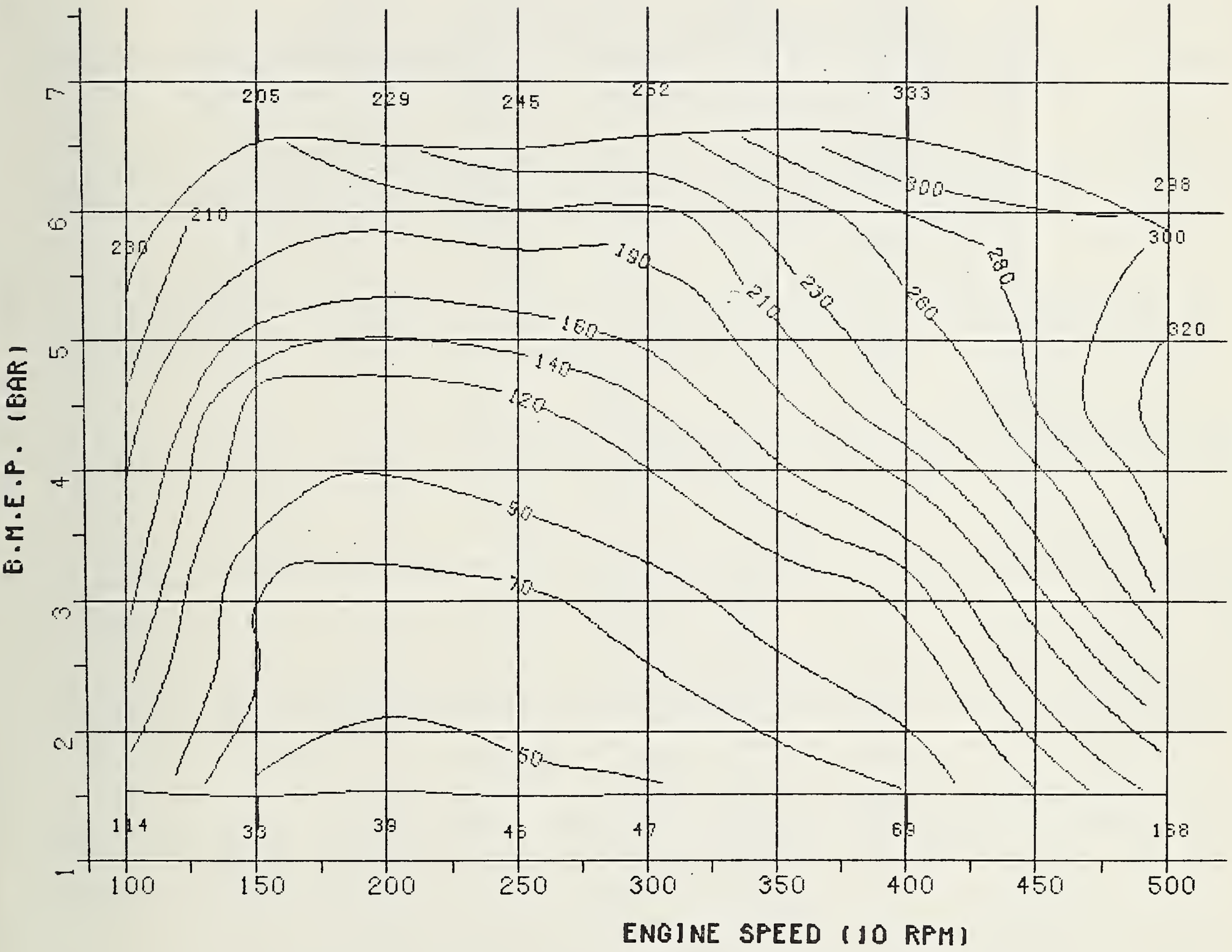

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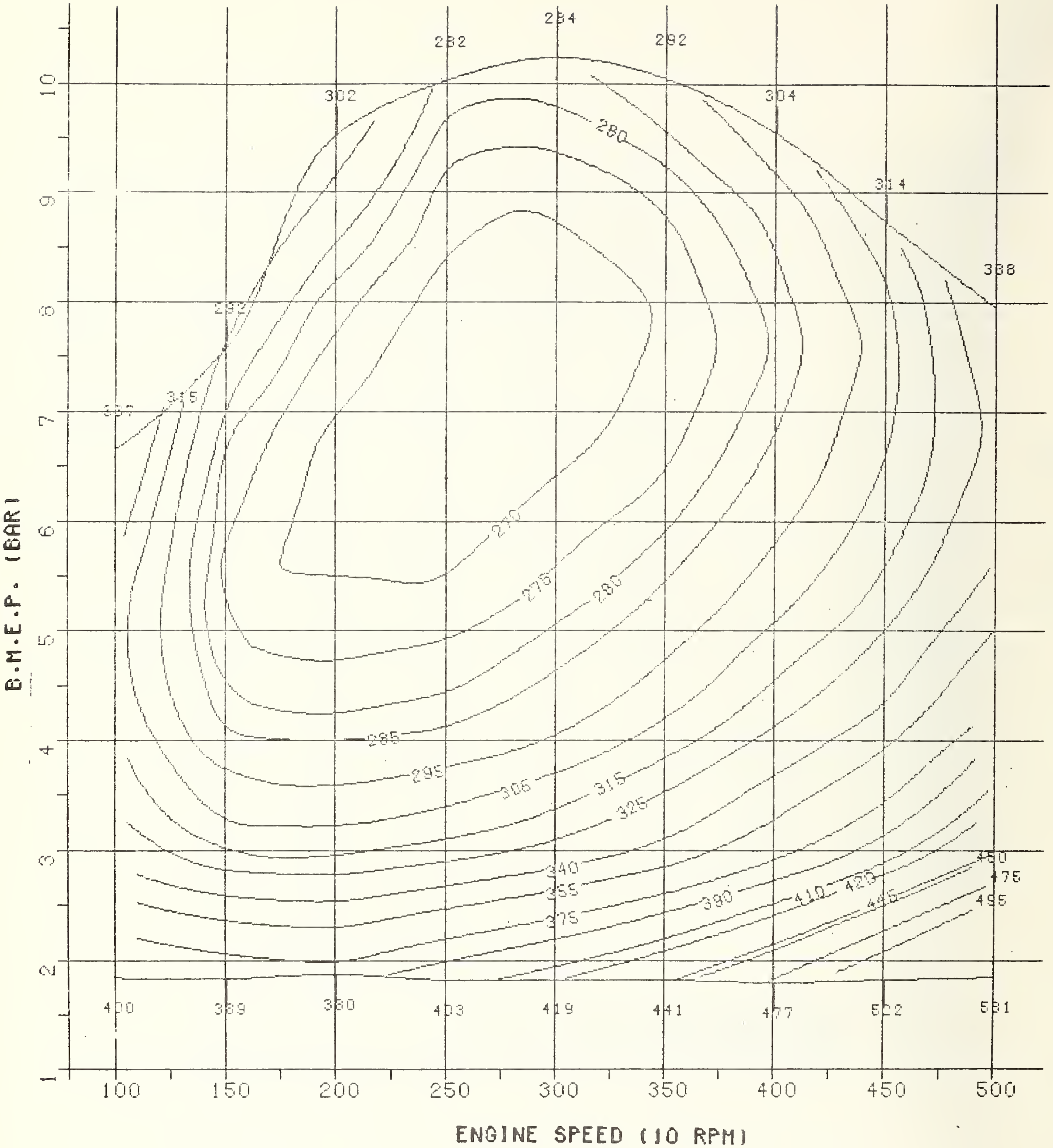

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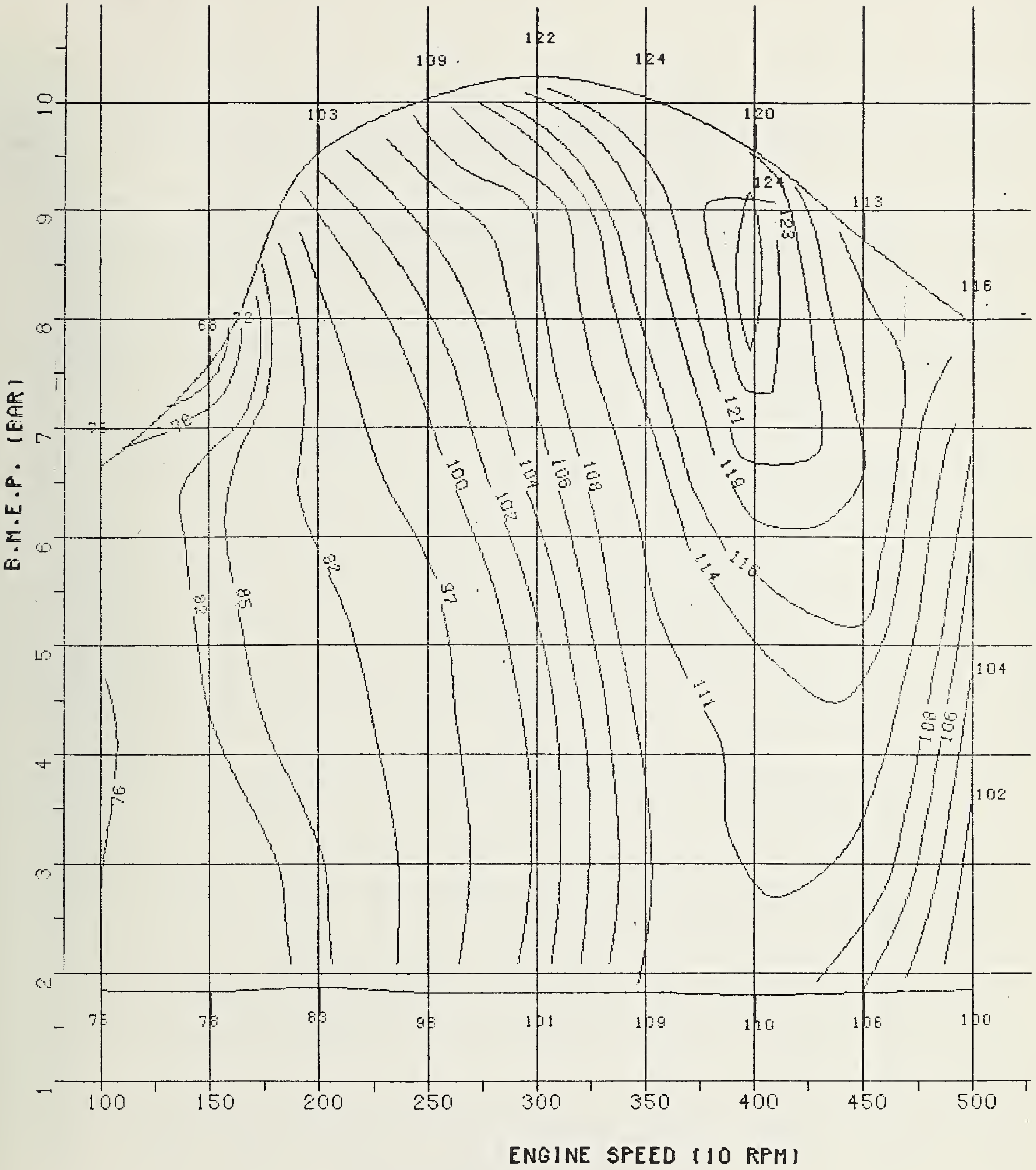

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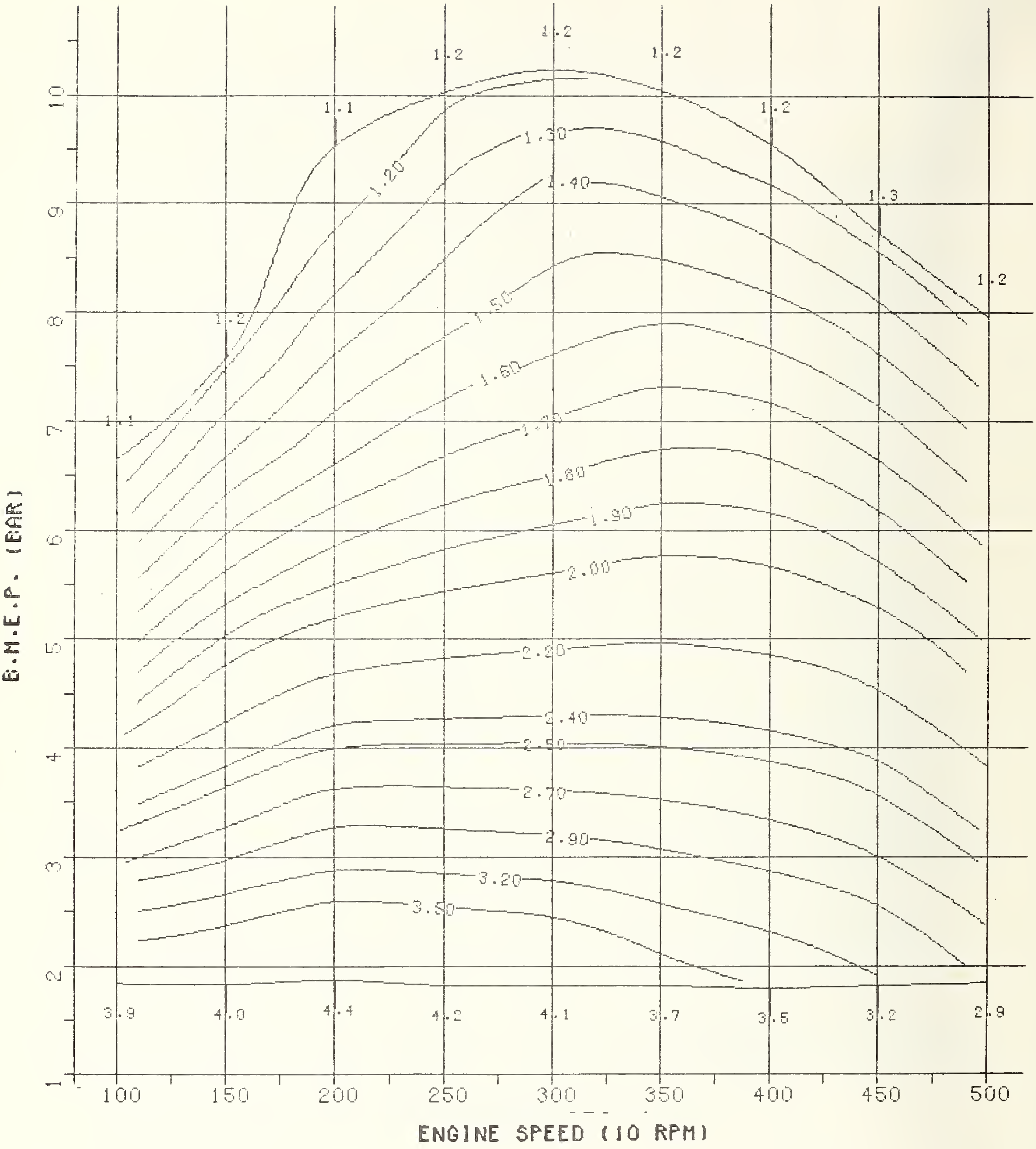

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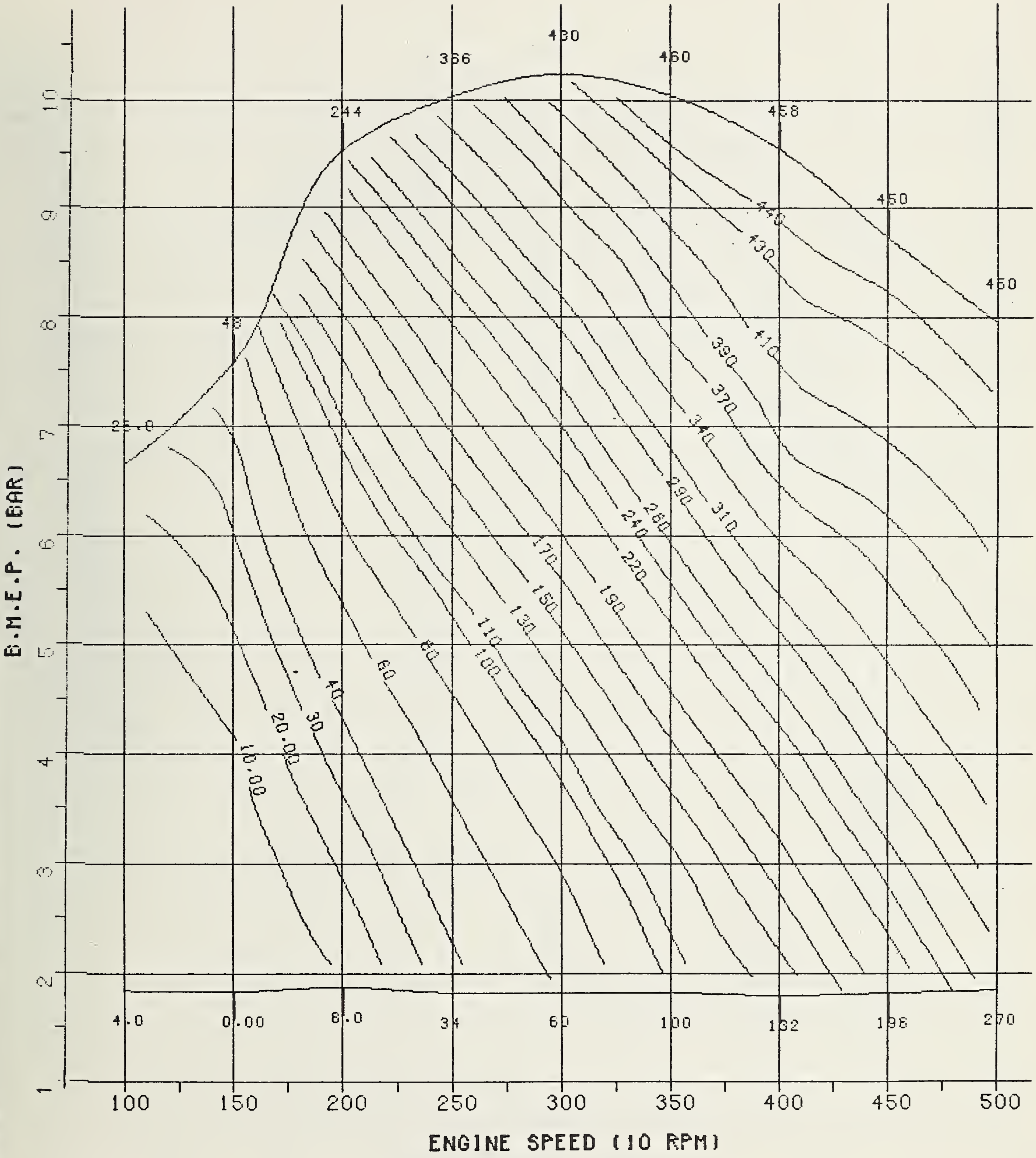

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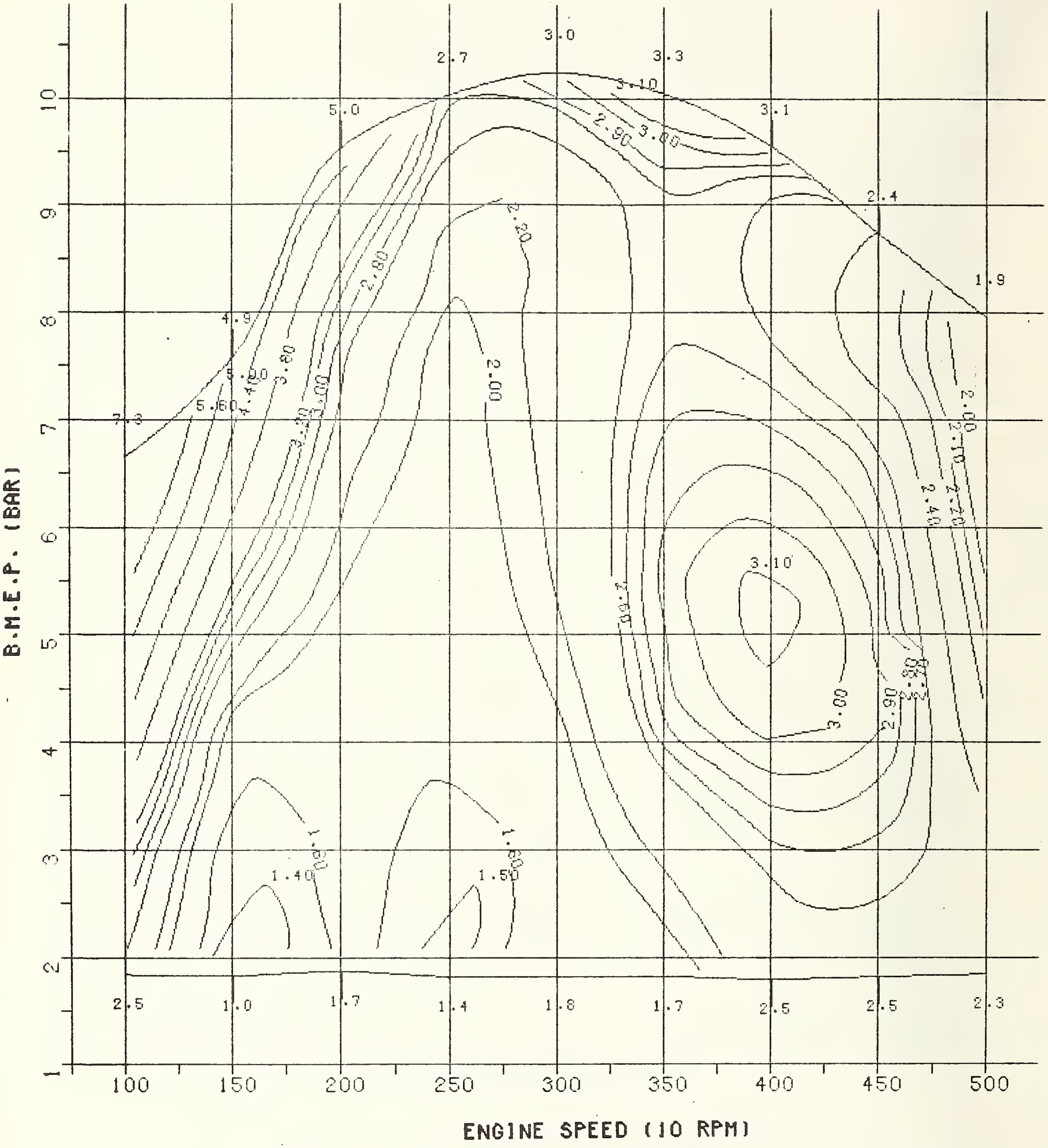

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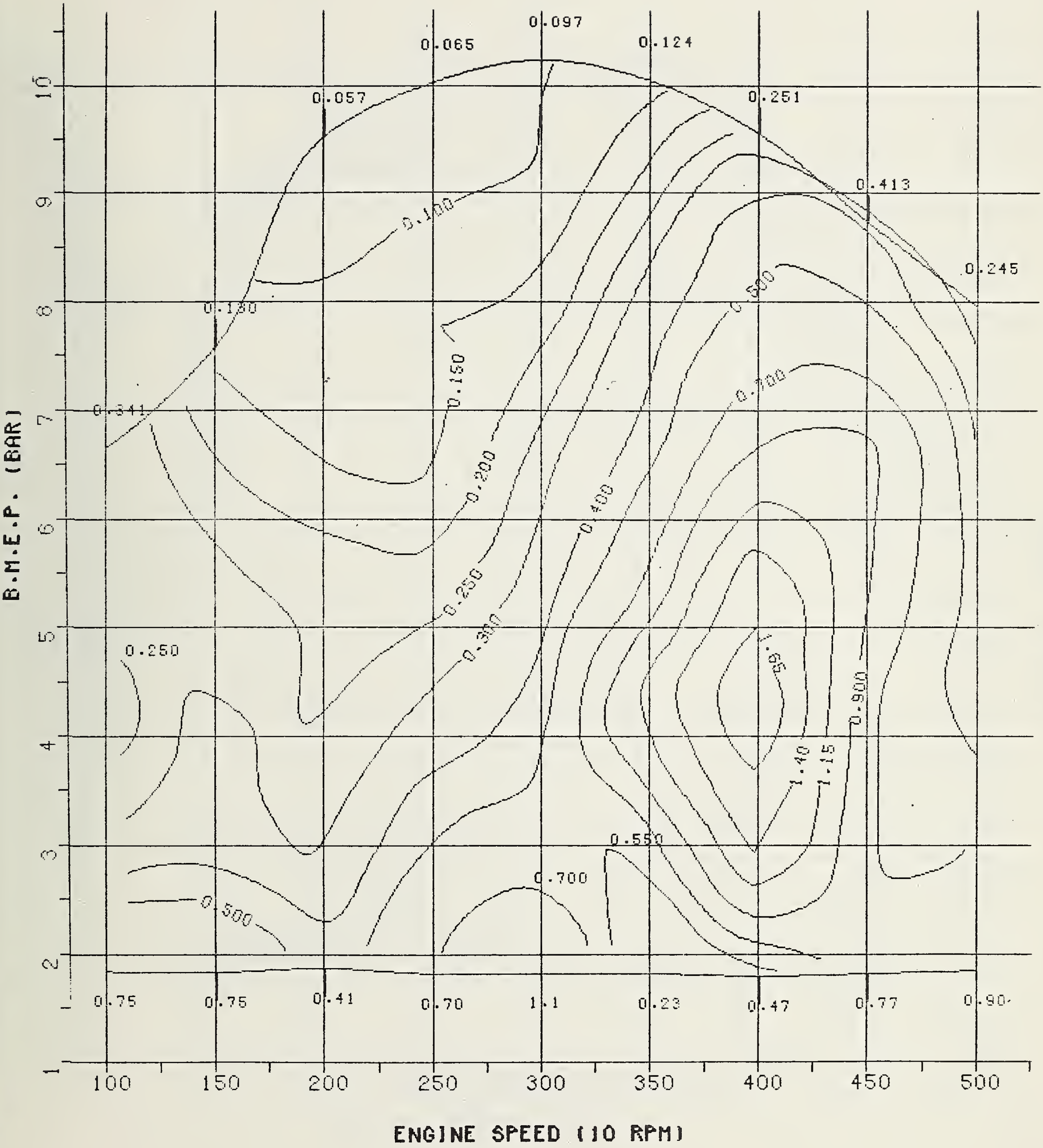

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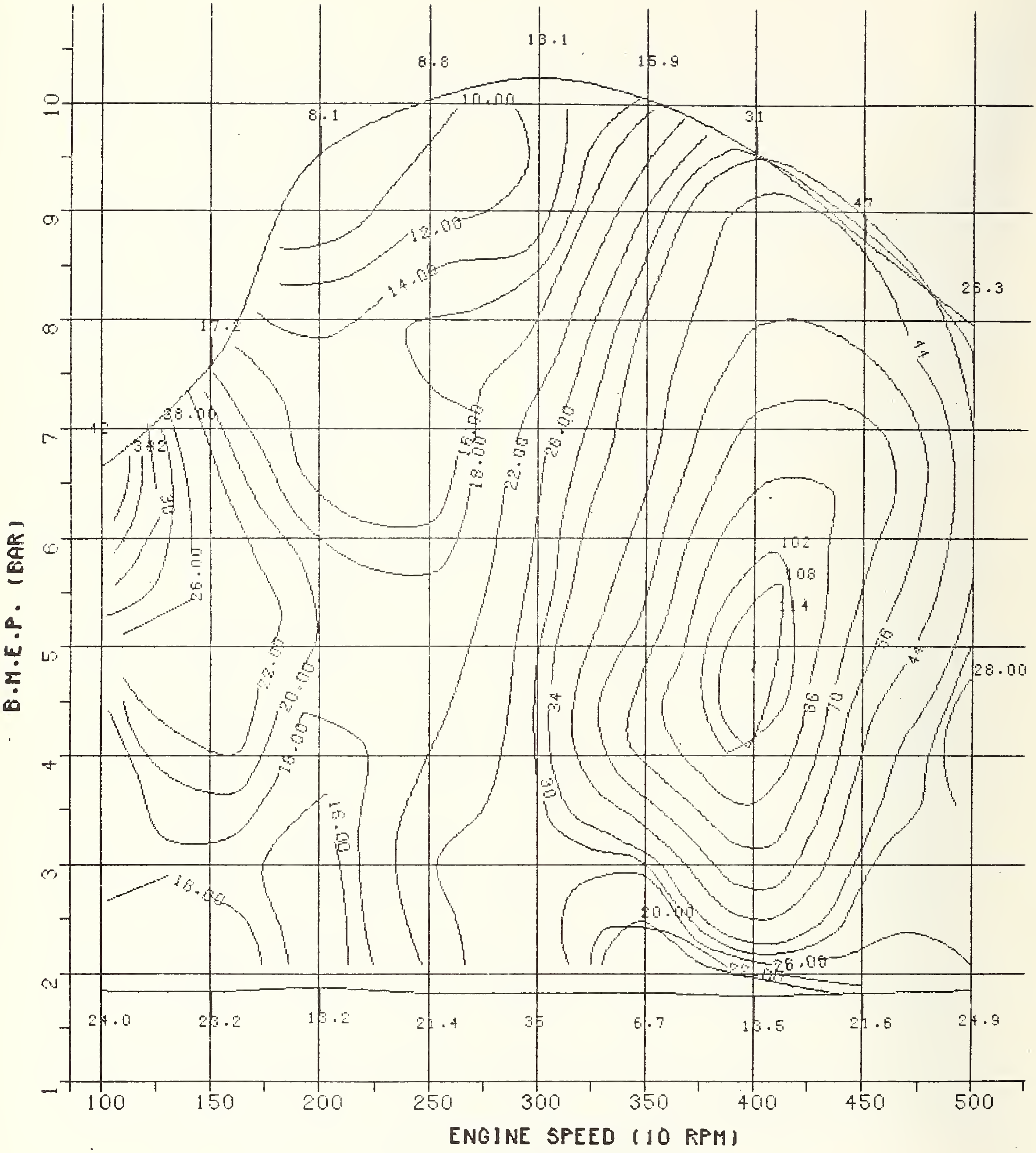

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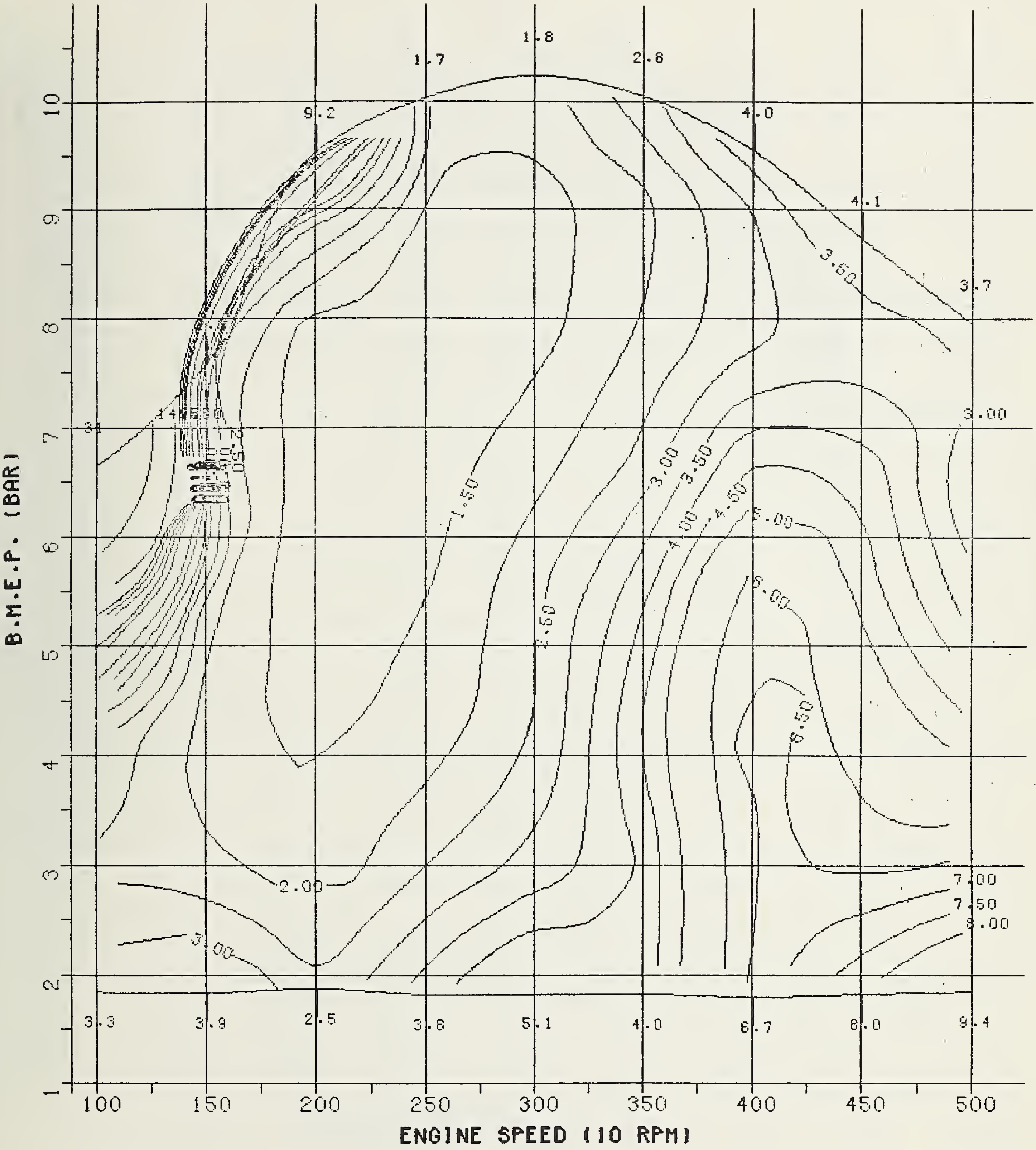

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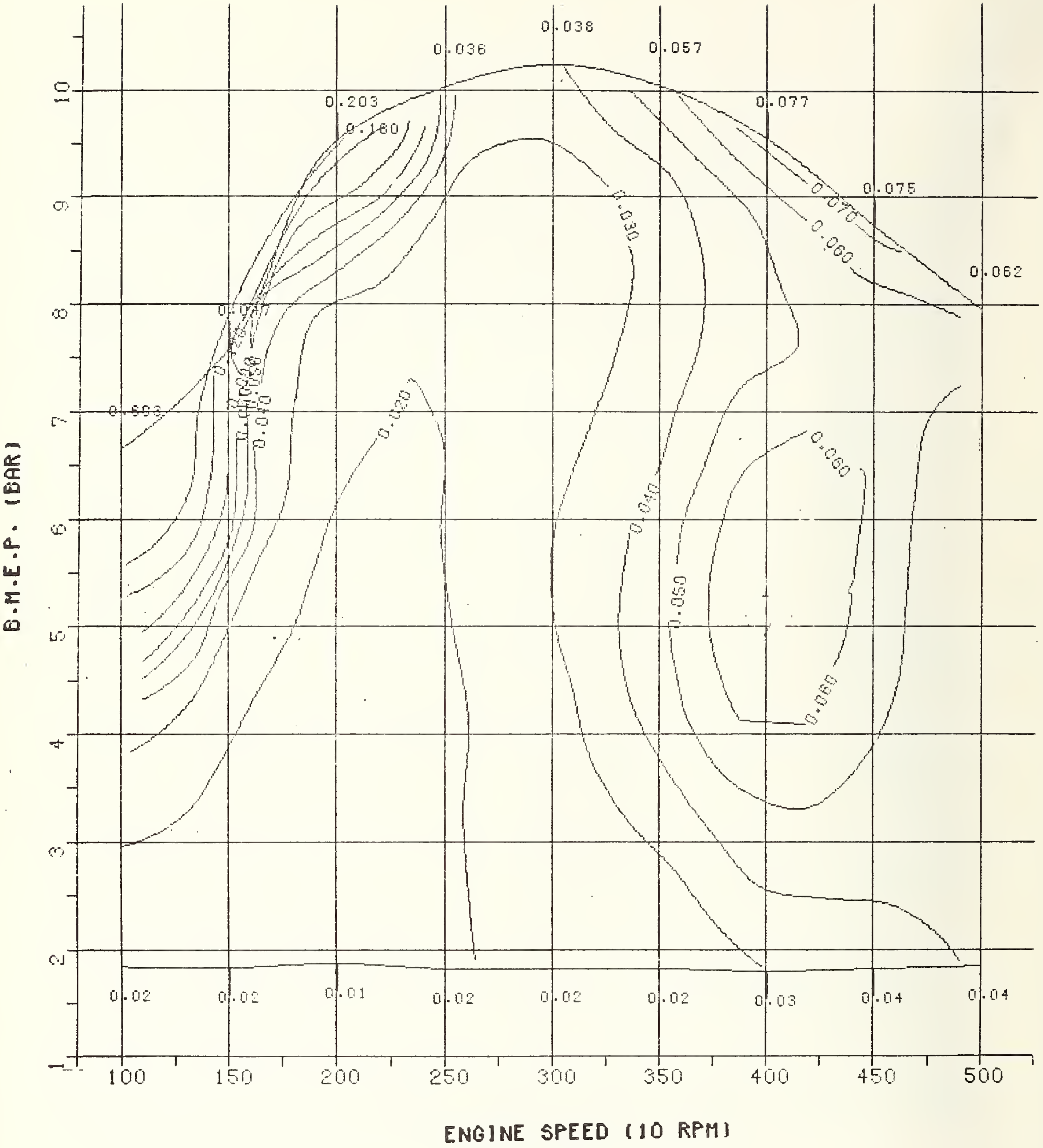

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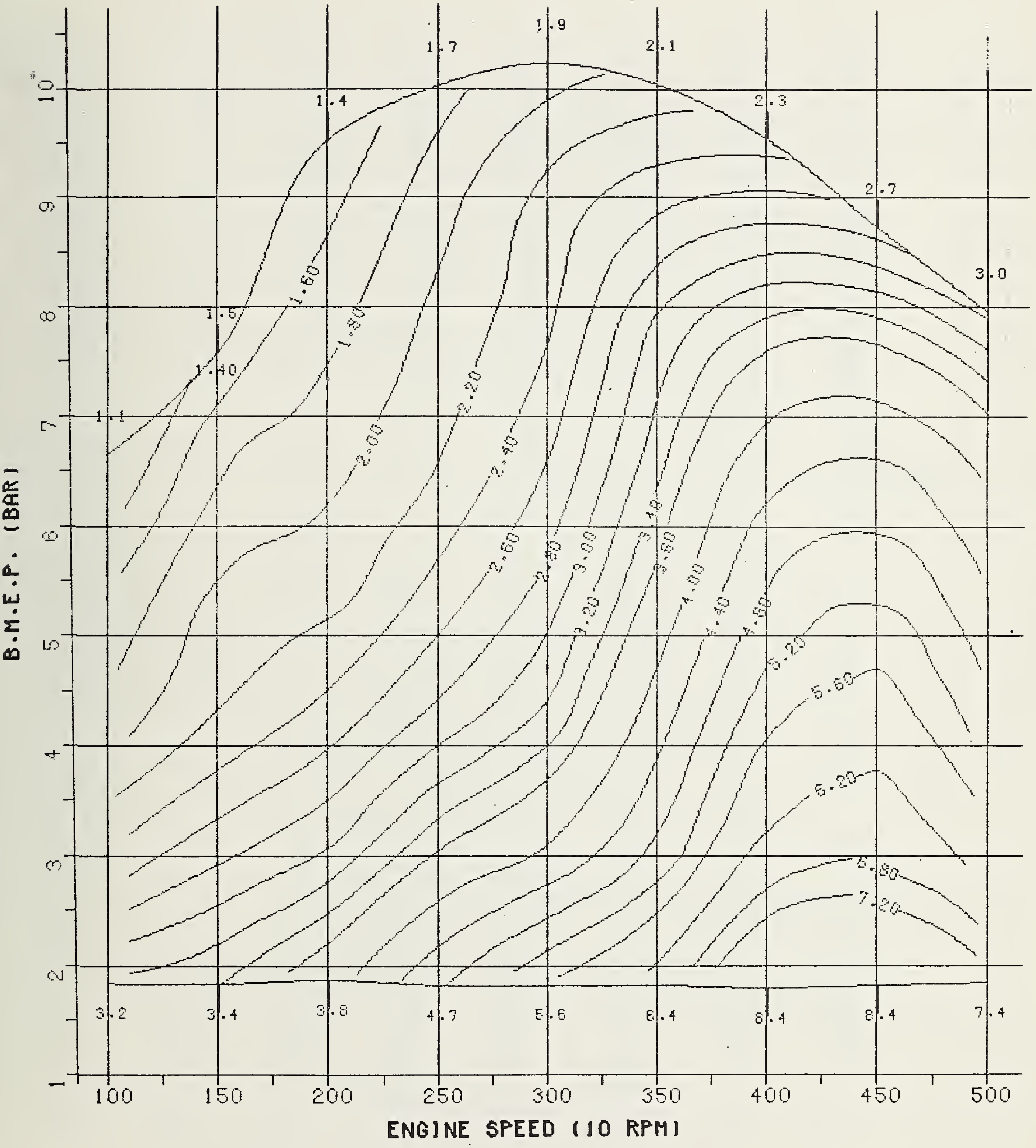

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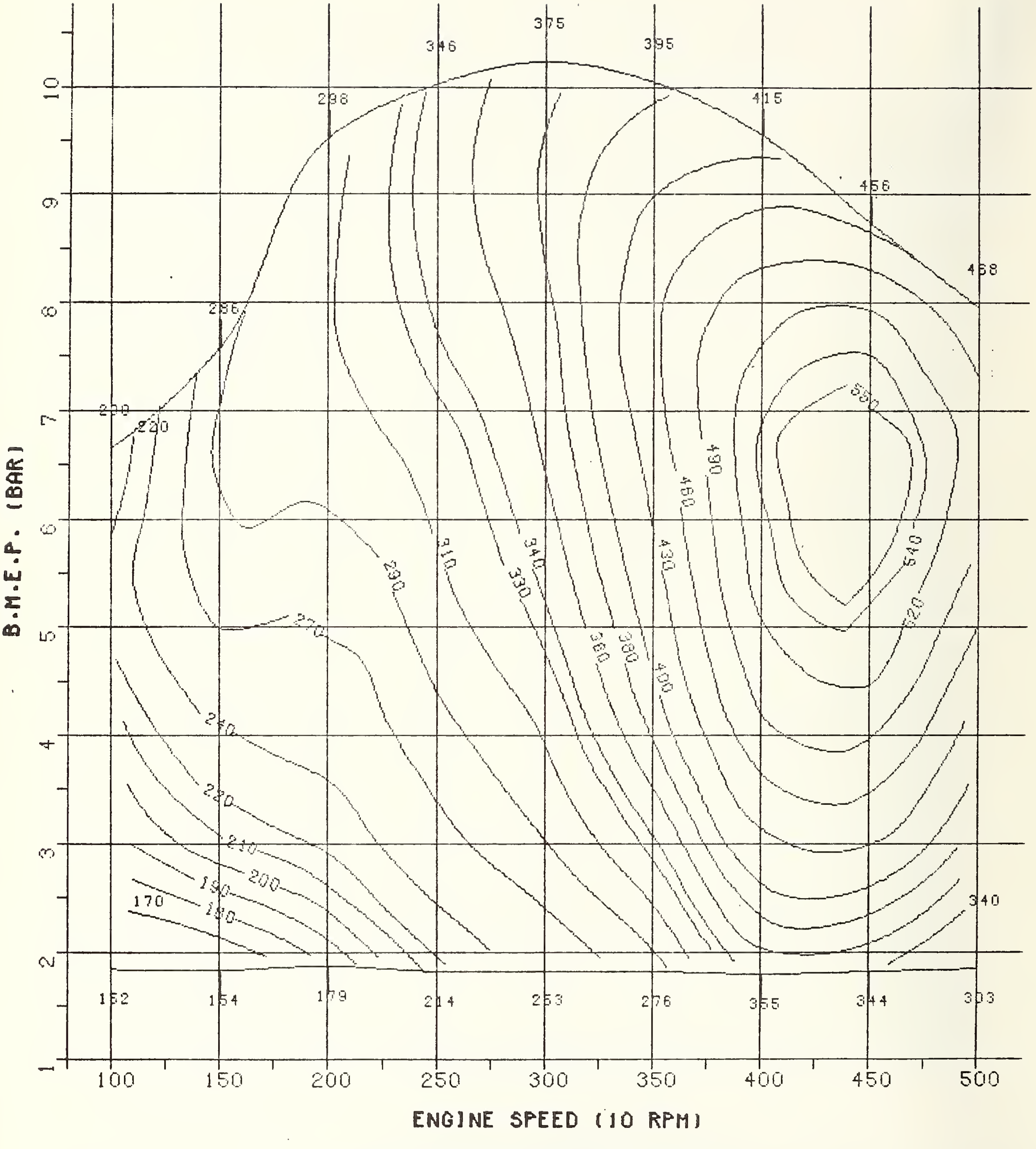

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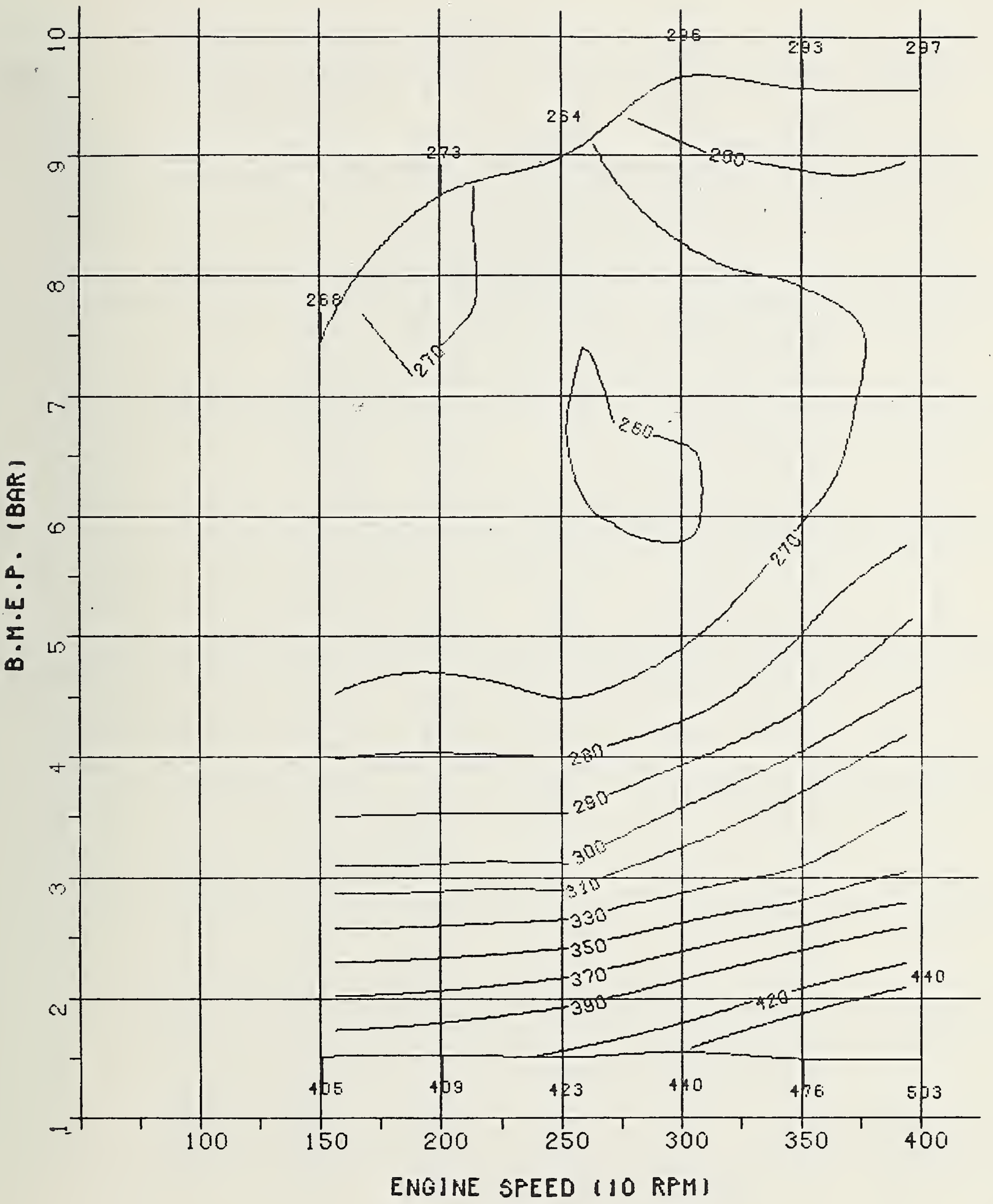
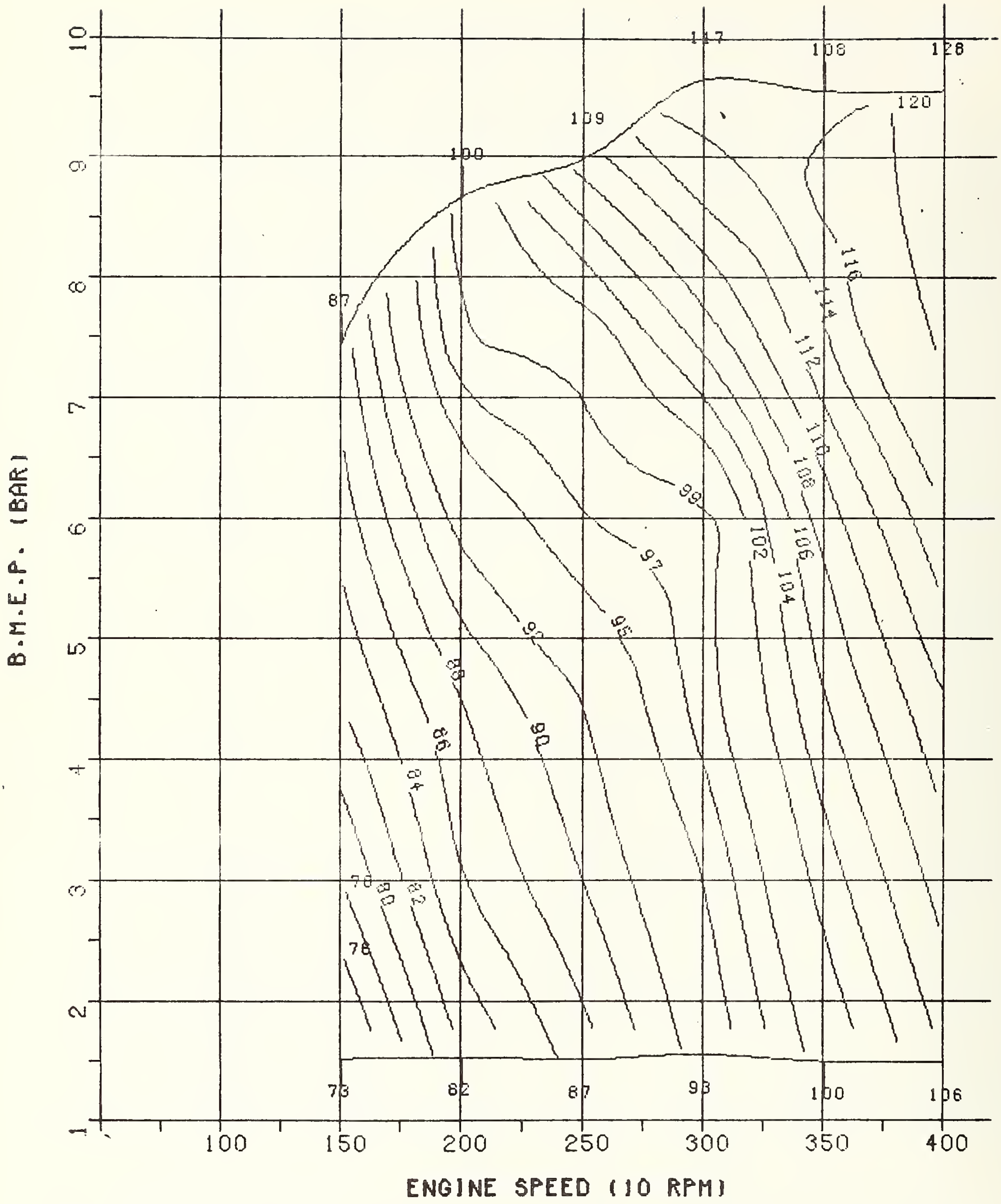


SPECIFIC FUEL CONSUMPTION (G/KWH)
70 HP TC DIESEL ENGINE WITH MODULATED E.G.R.



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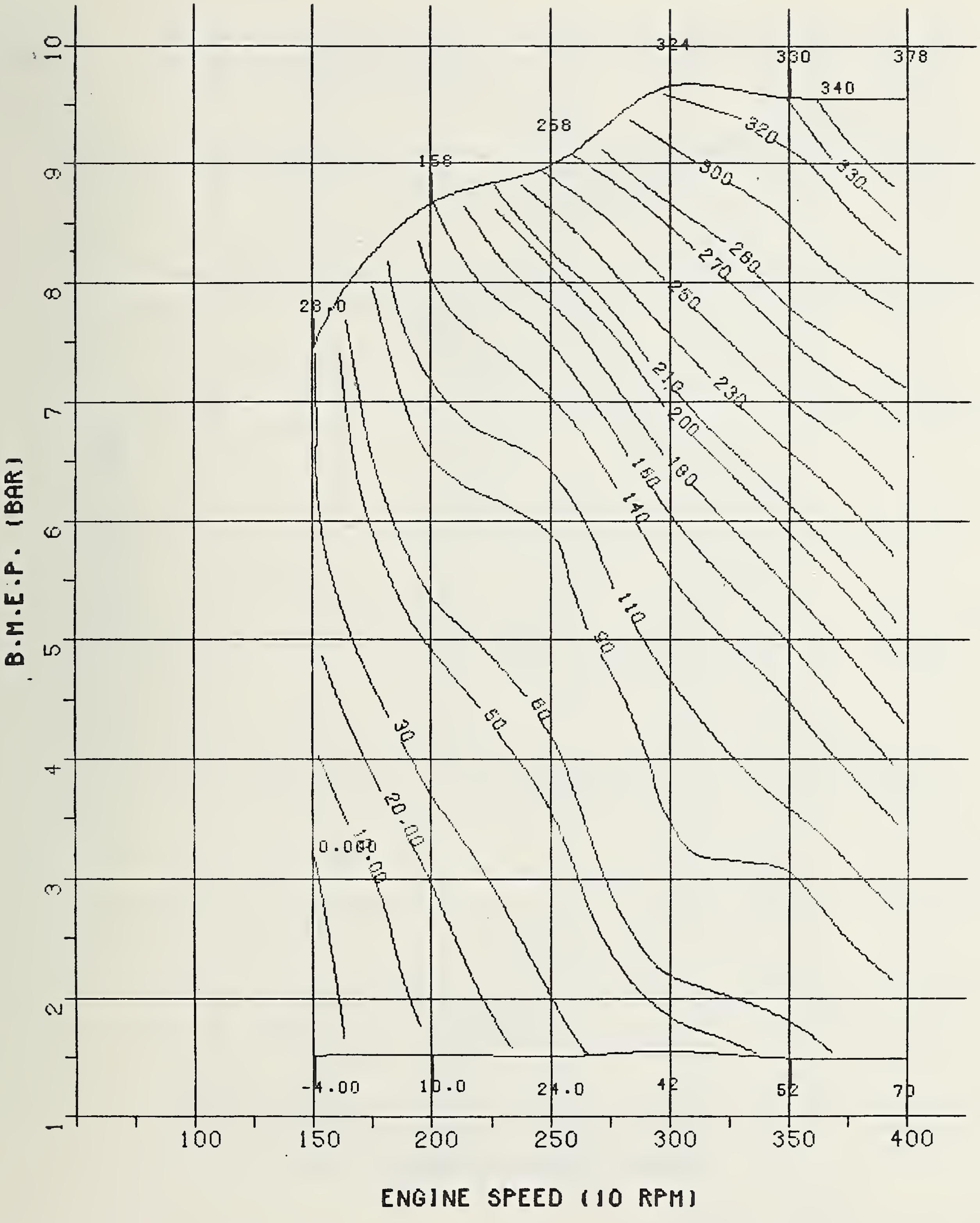

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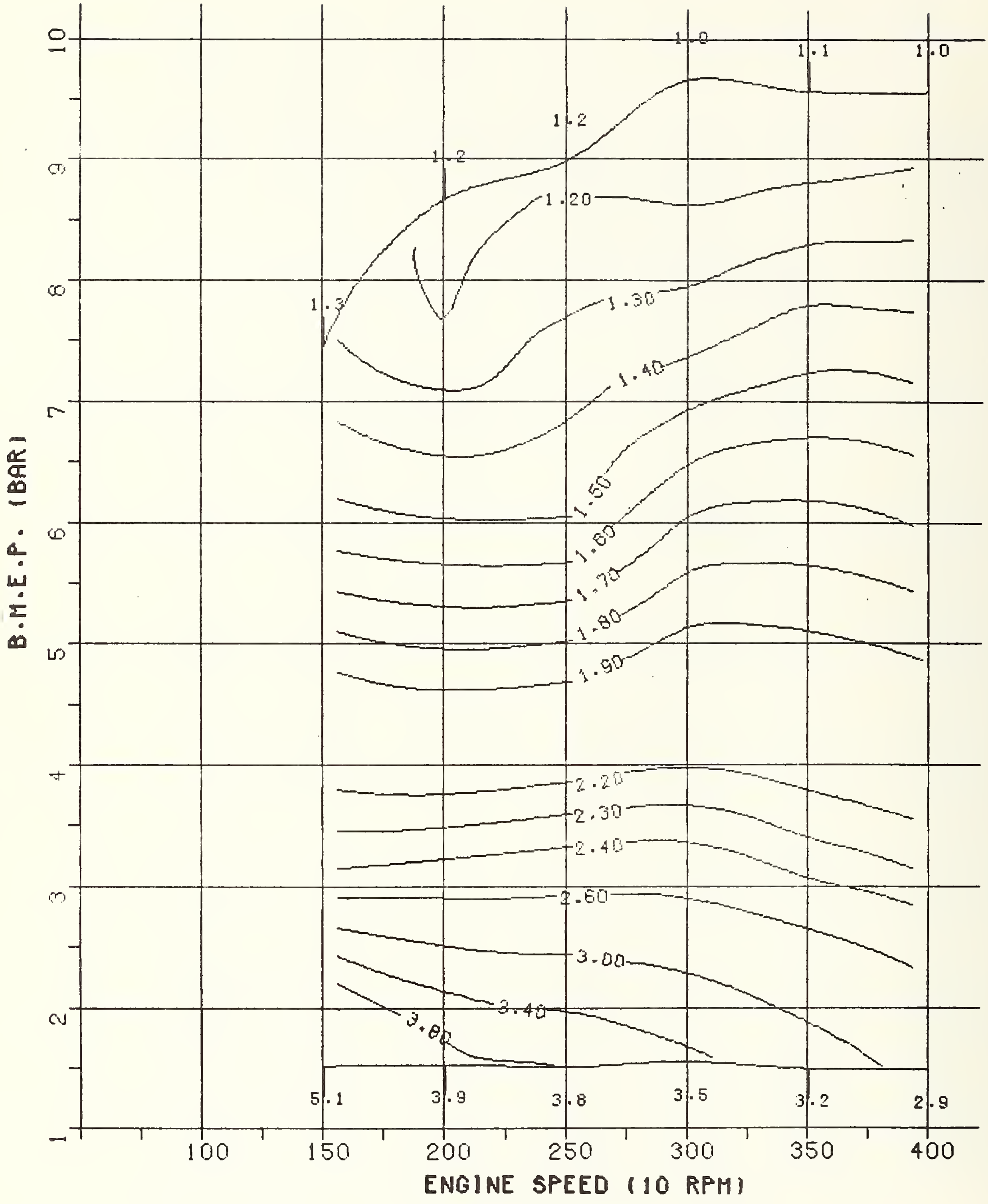

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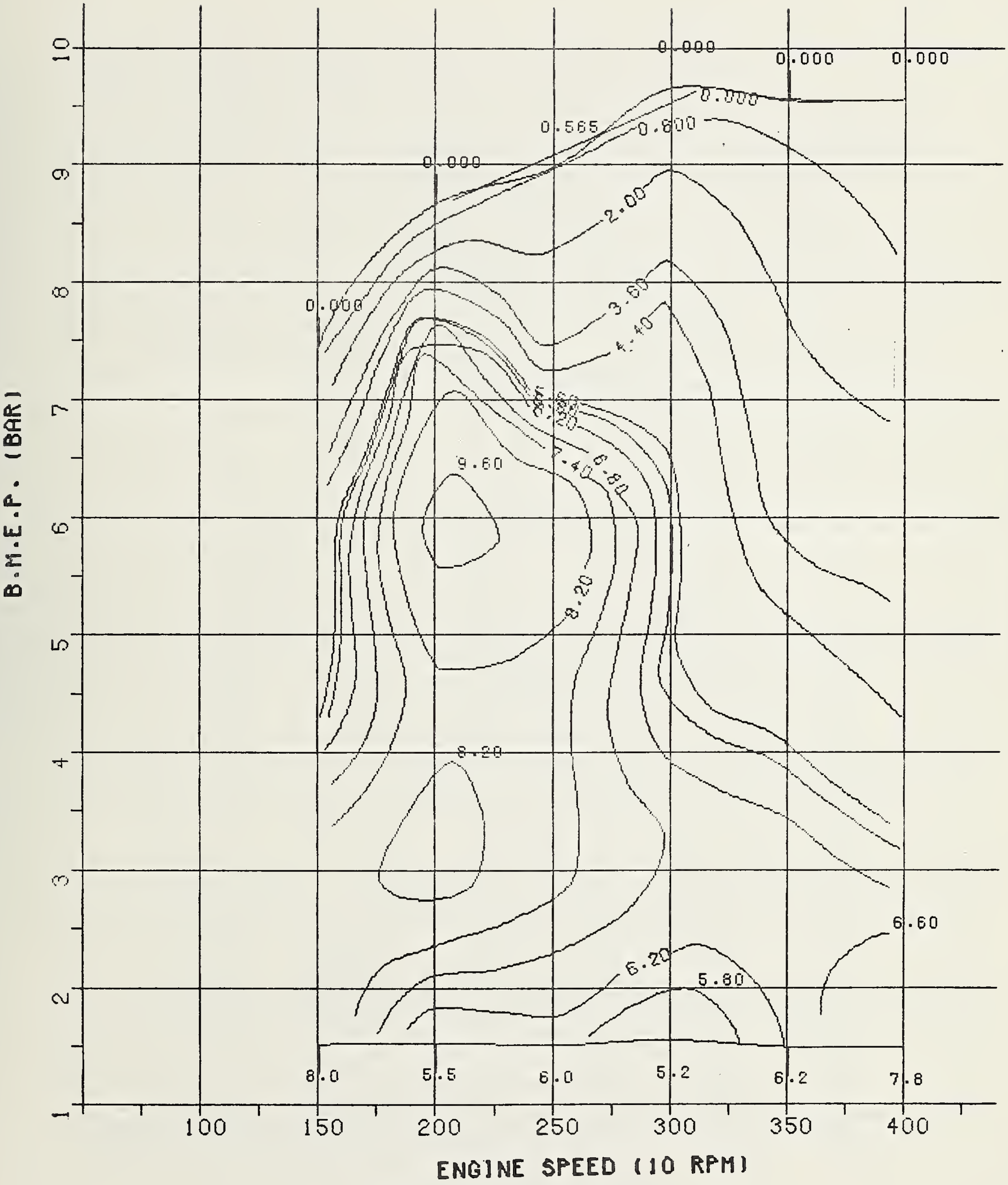
70 HP TC DIESEL ENGINE WITH MODULATED E.G.R.



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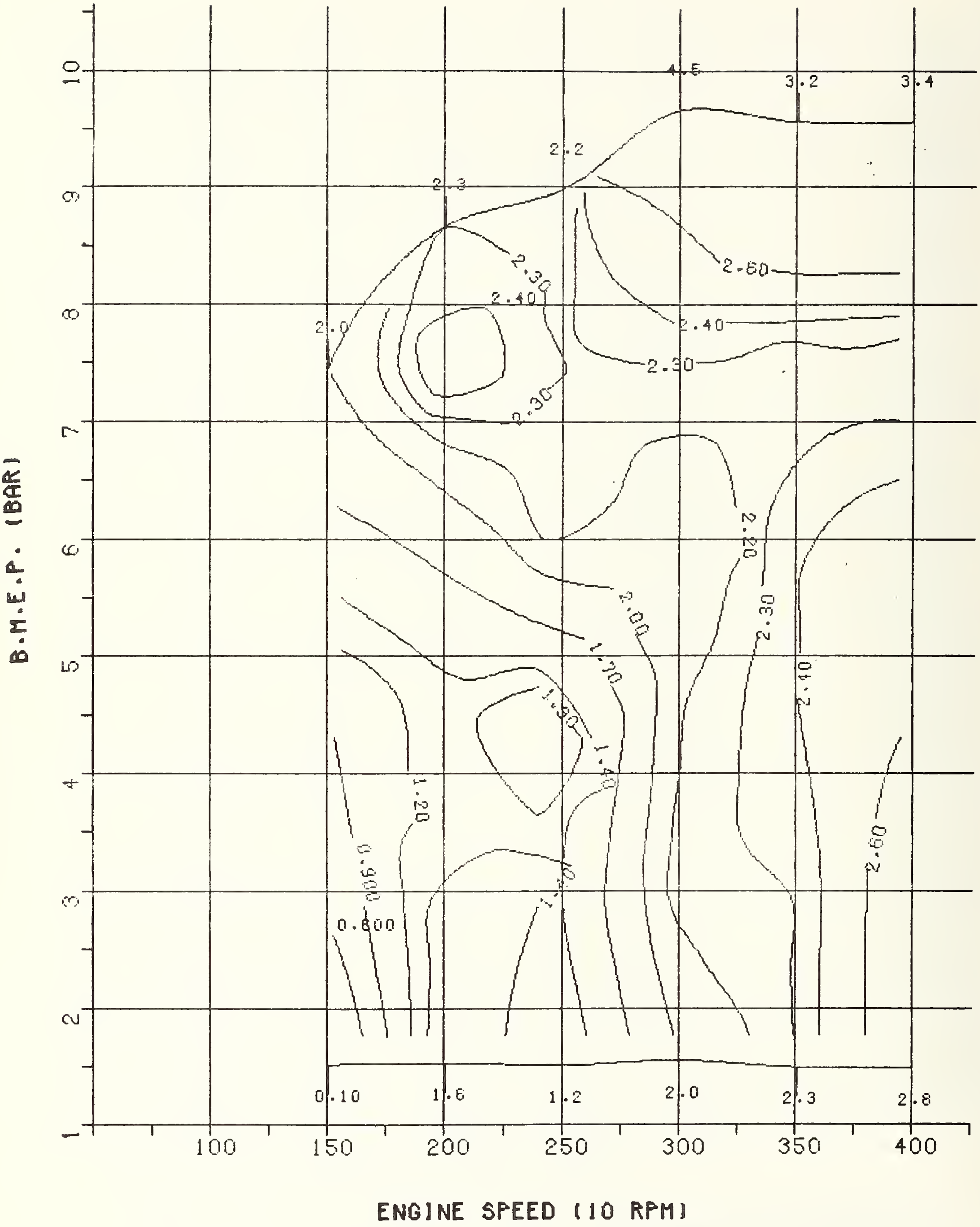

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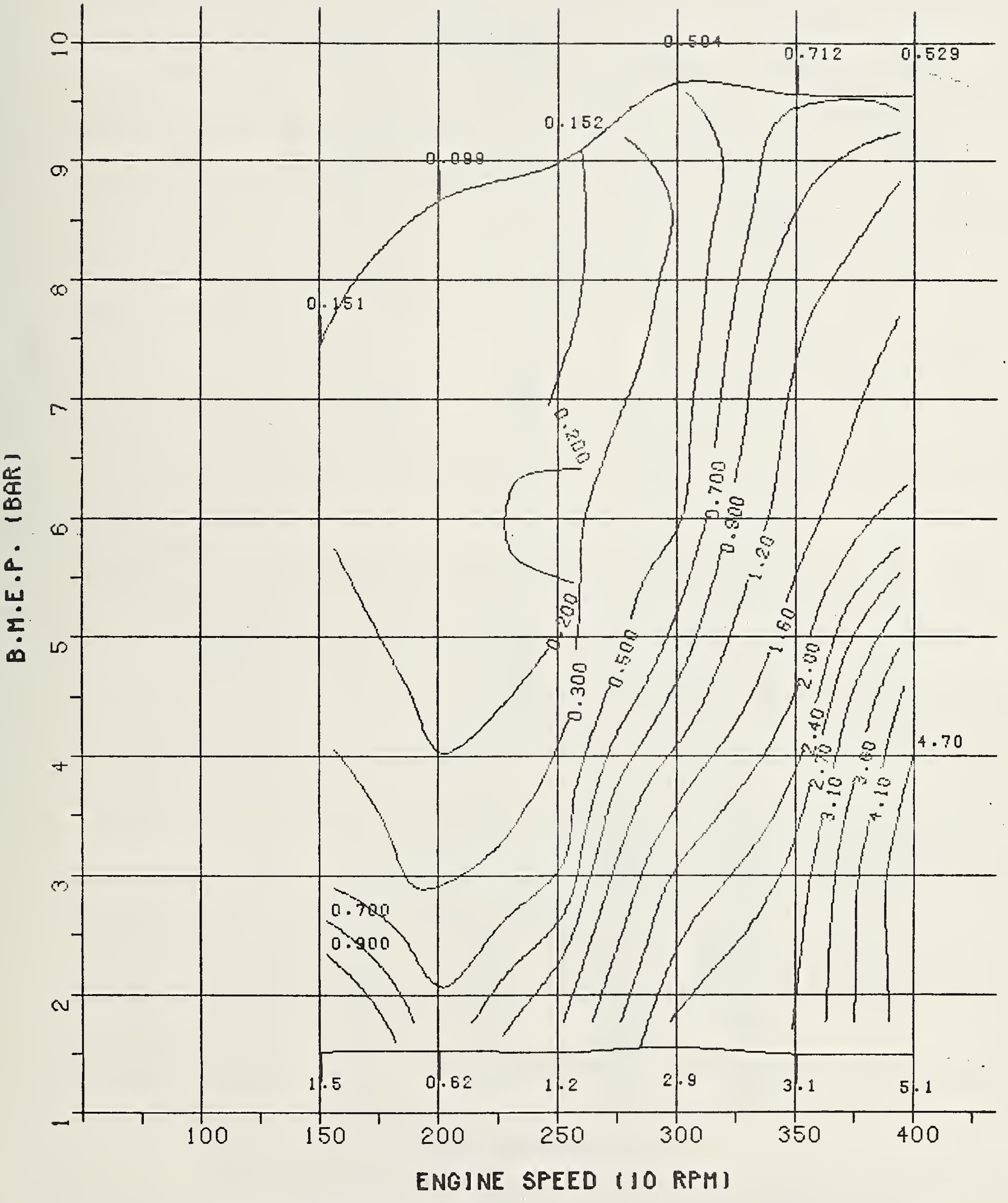
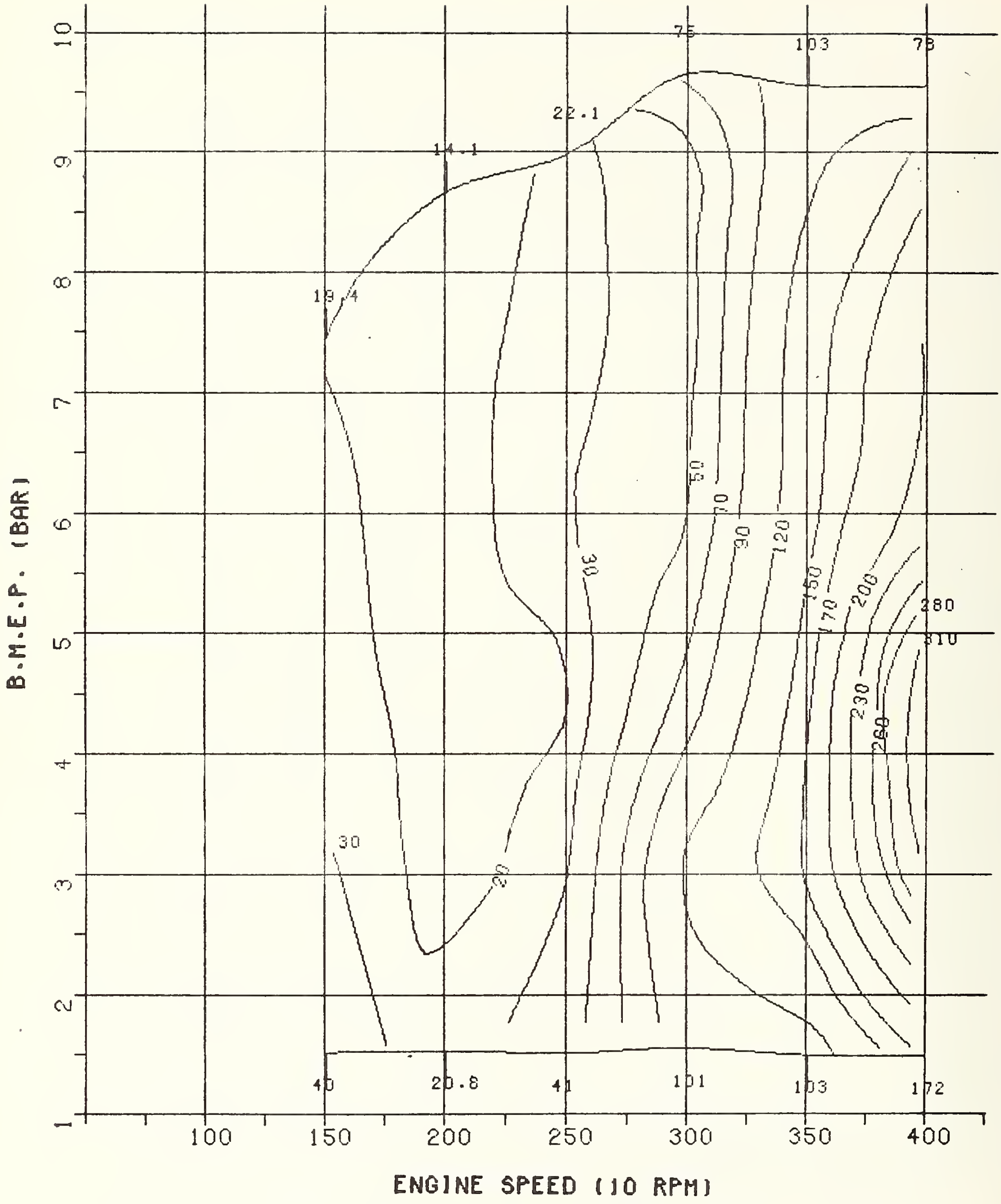
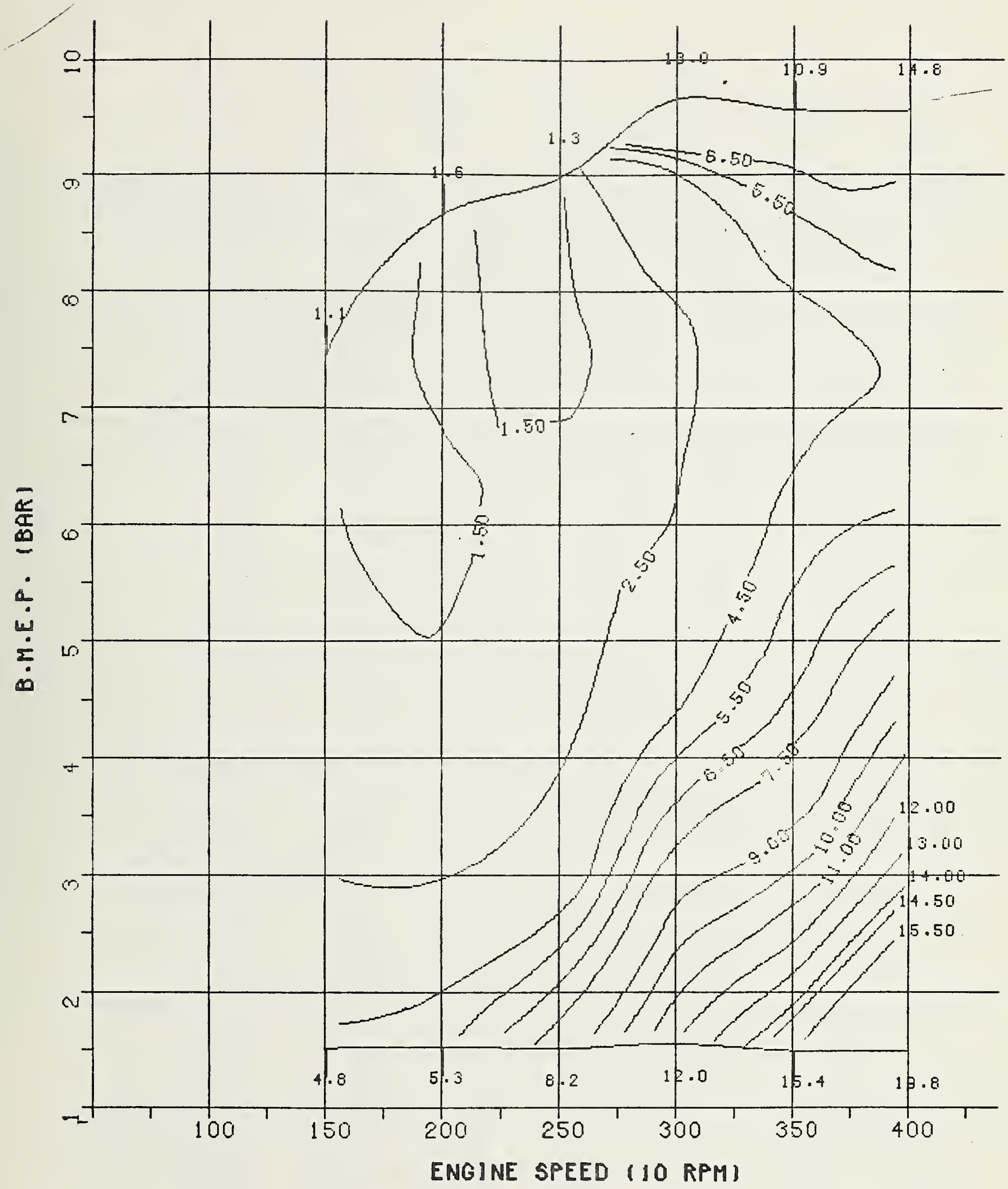


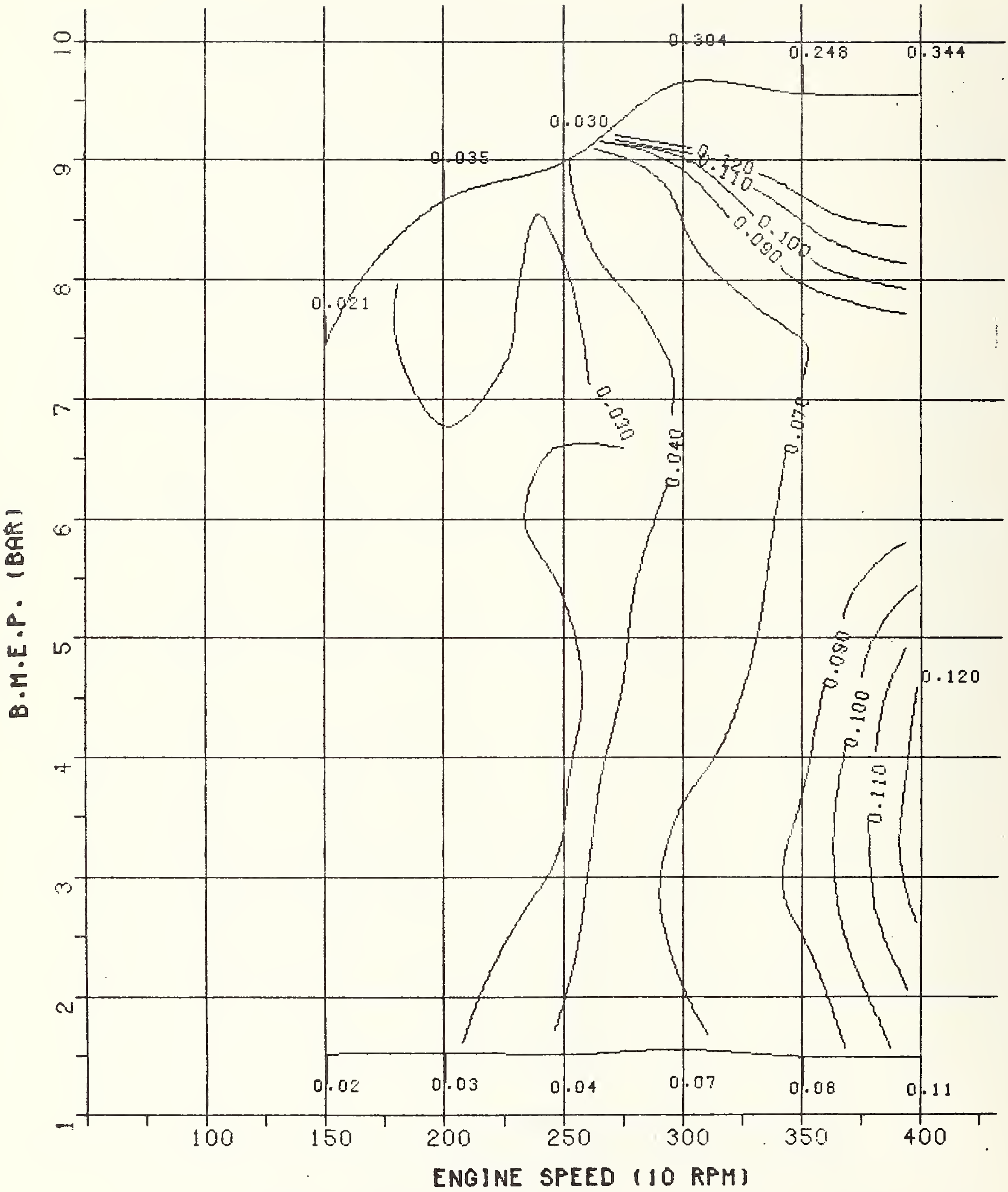
HC EMISSION (G/KWH)
70 HP TC DIESEL ENGINE WITH MODULATED E.G.R.



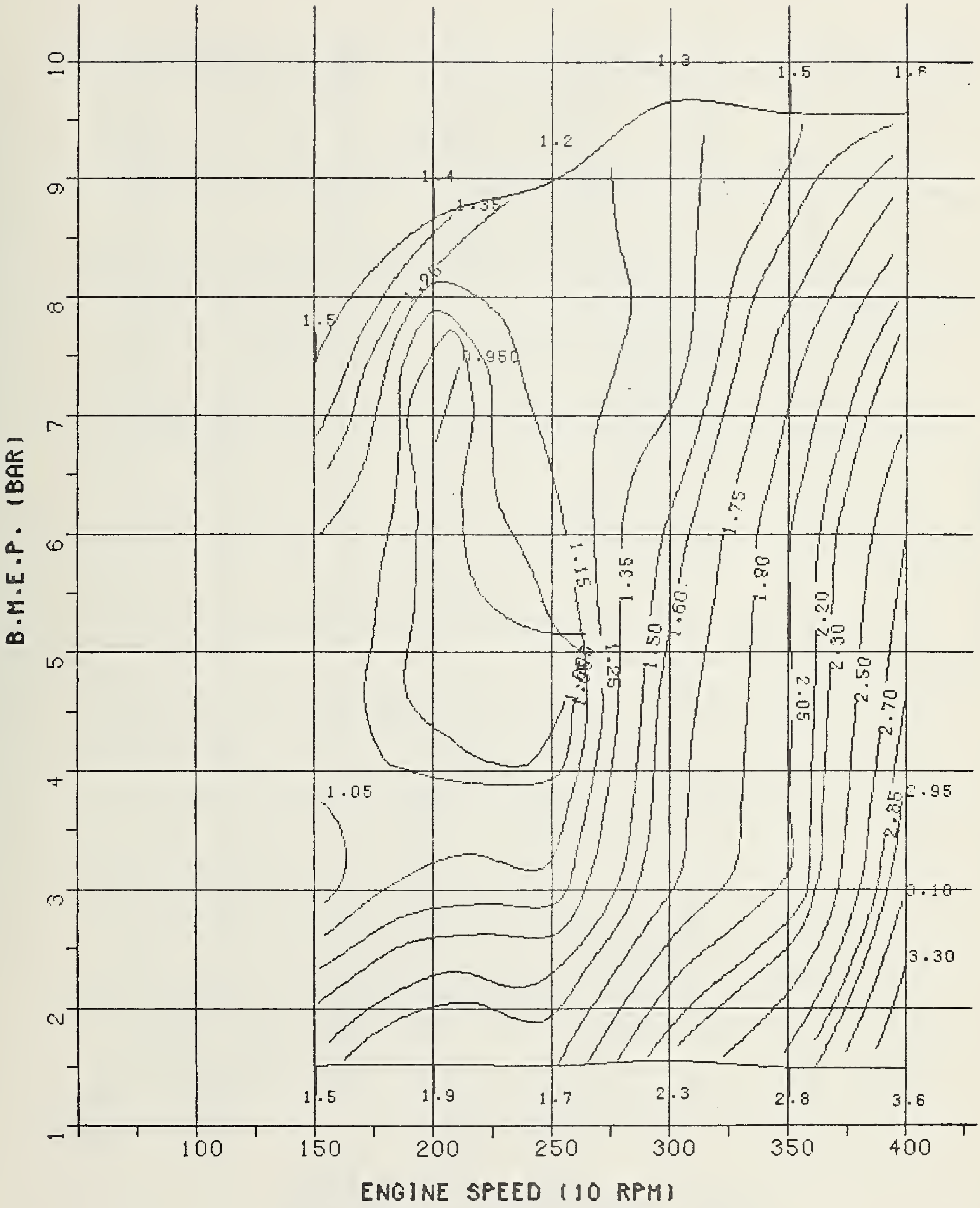
HC CONCENTRATION (PPM)
70 HP TC DIESEL ENGINE WITH MODULATED E.G.R.



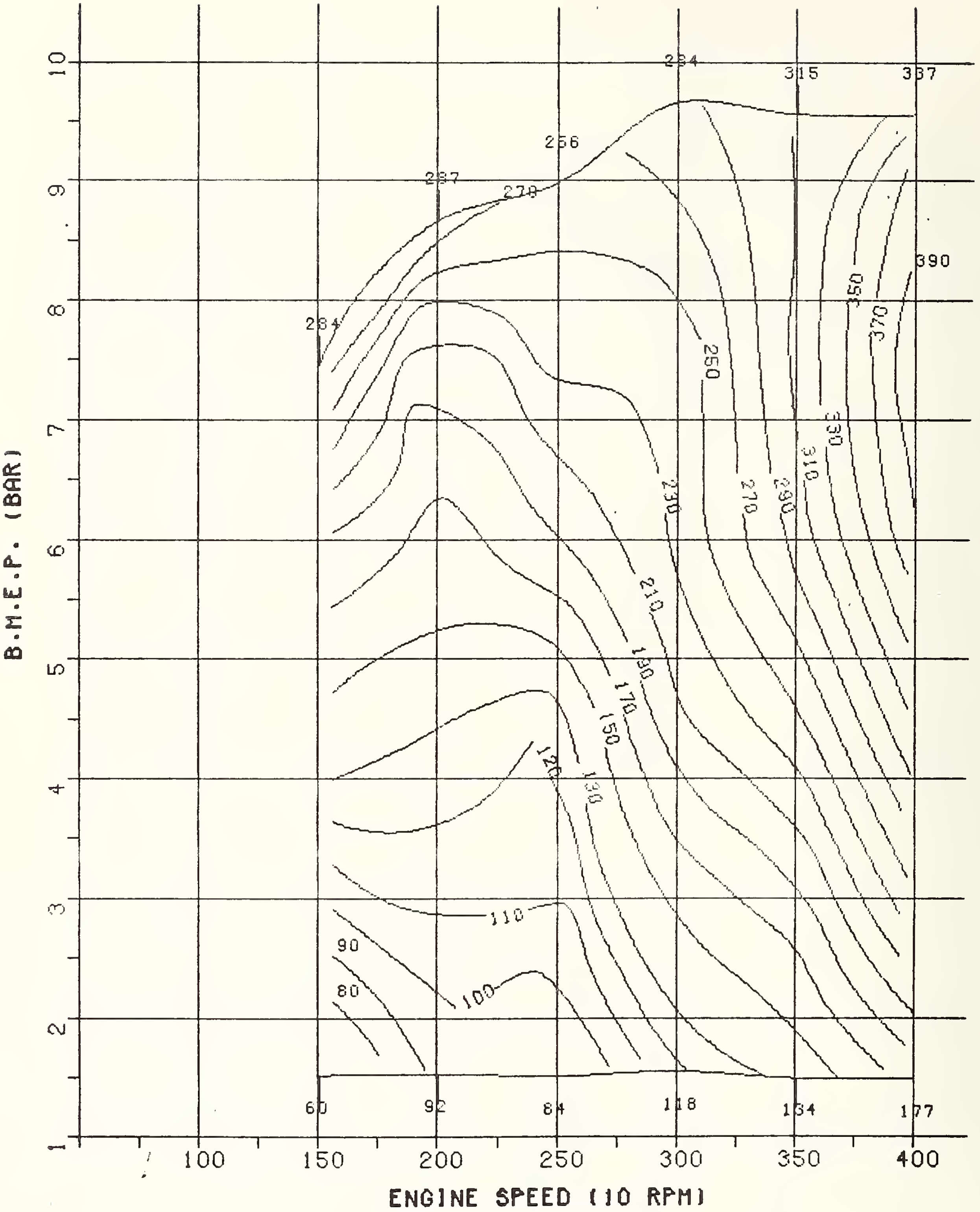
CO EMISSION (G/KWH)
70 HP TC DIESEL ENGINE WITH MODULATED E.G.R.



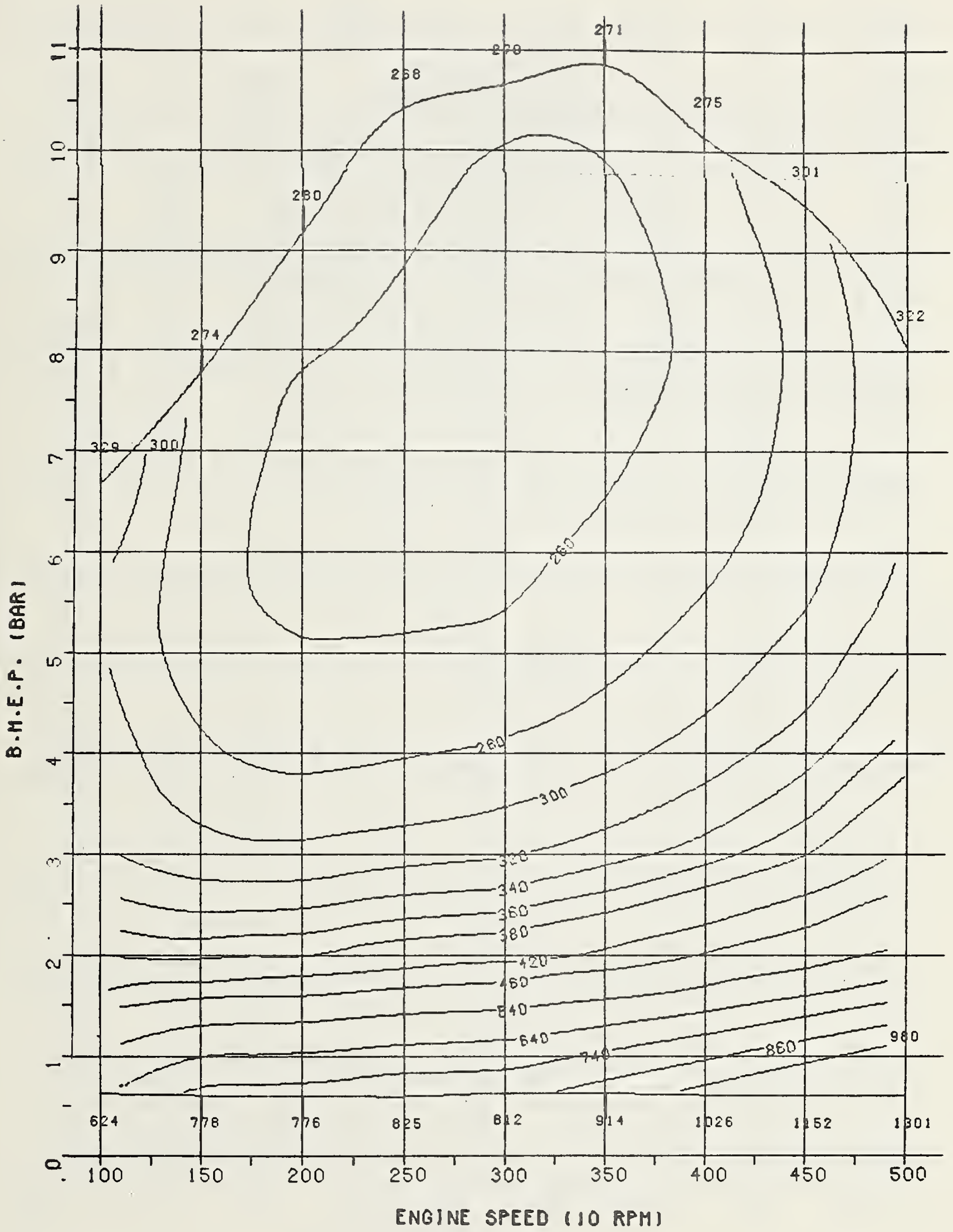
CO CONCENTRATION (%)
70 HP TC DIESEL ENGINE WITH MODULATED E.G.R.



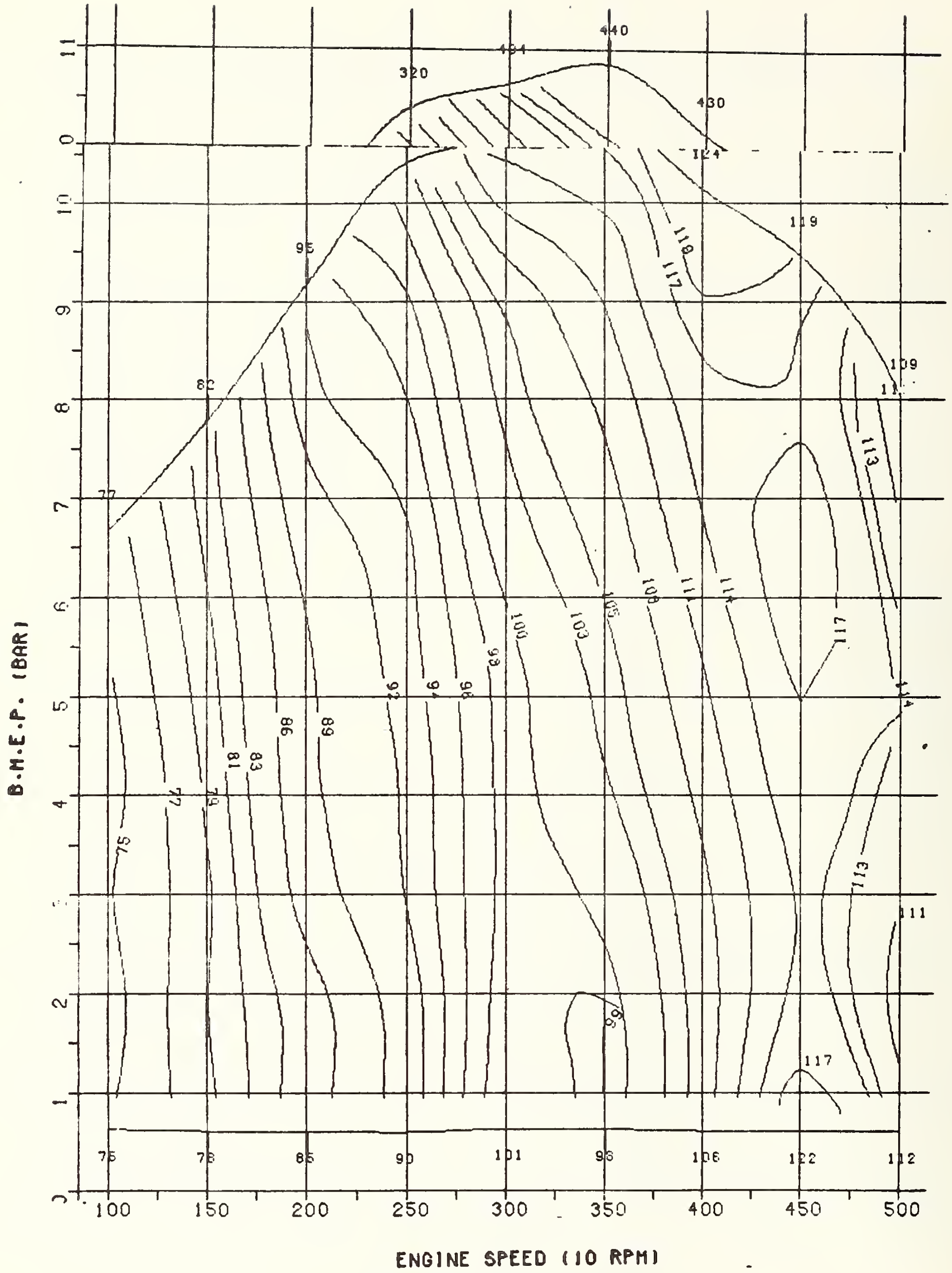
NO EMISSION (G/KWH)
70 HP TC DIESEL ENGINE WITH MODULATED E.G.R.



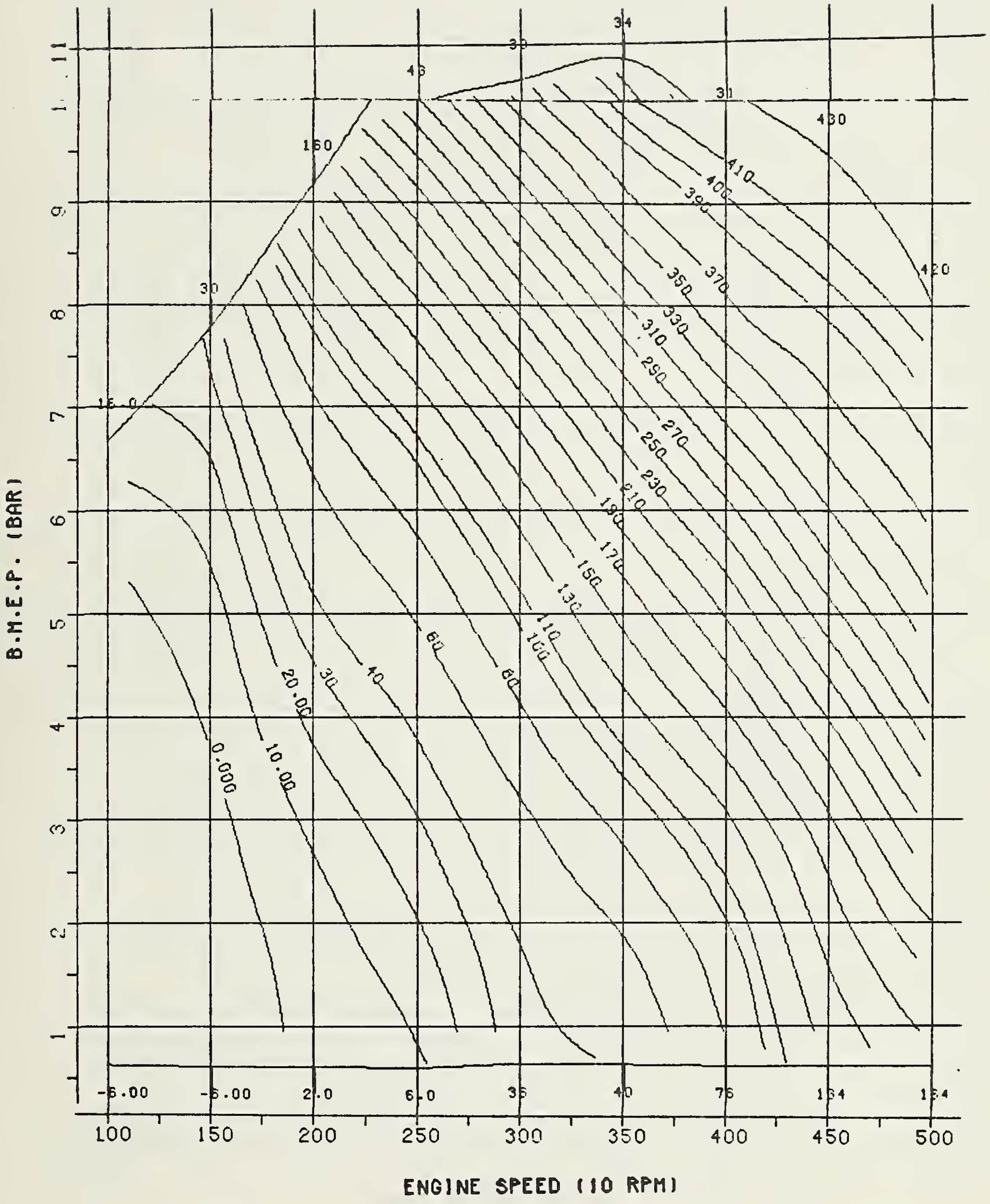
NO CONCENTRATION (PPM)
70 HP TC DIESEL ENGINE WITH MODULATED E.G.R.



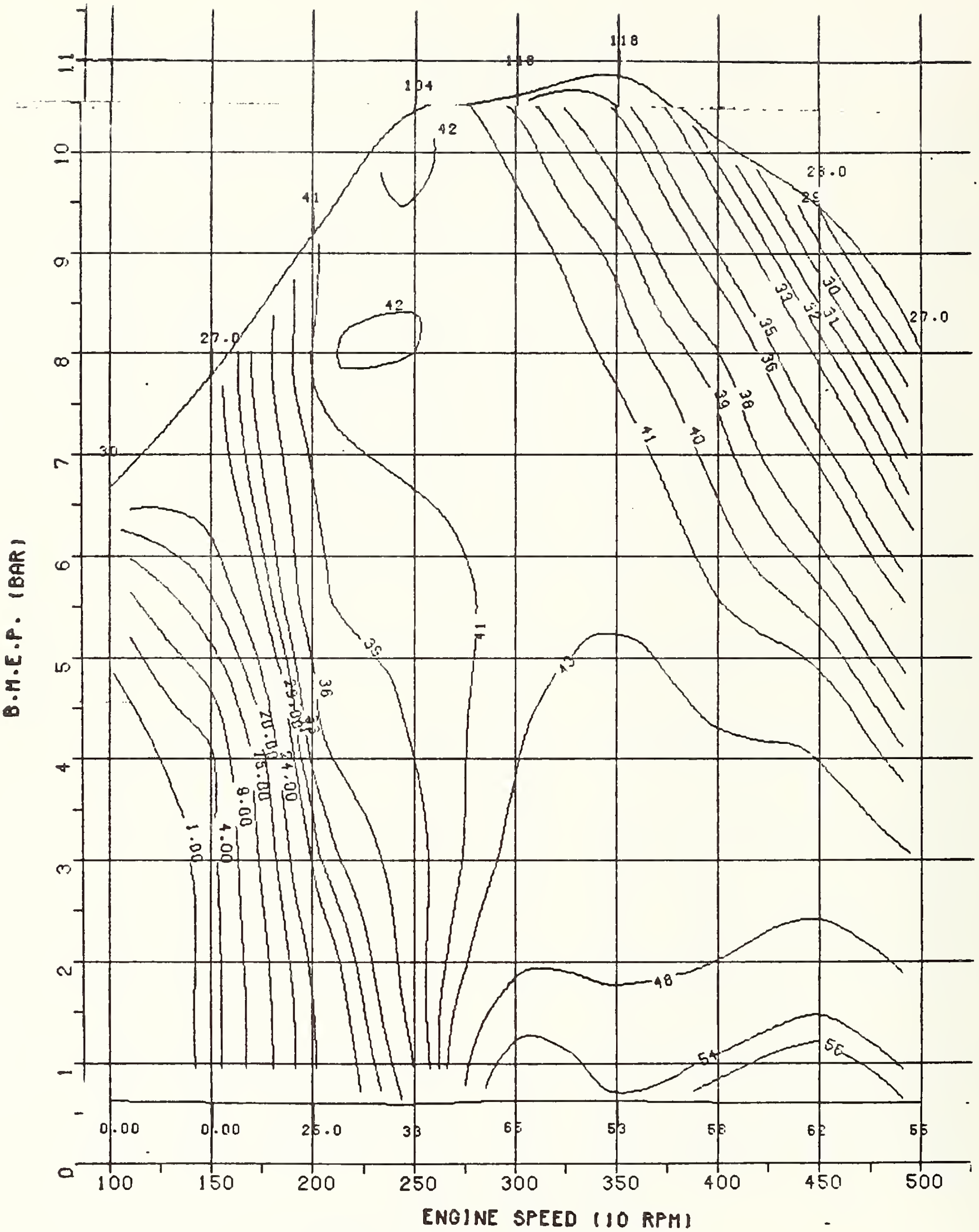
SPECIFIC FUEL CONSUMPTION (G/KWH)
70 HP TC DIESEL WITH WATER INJECTION



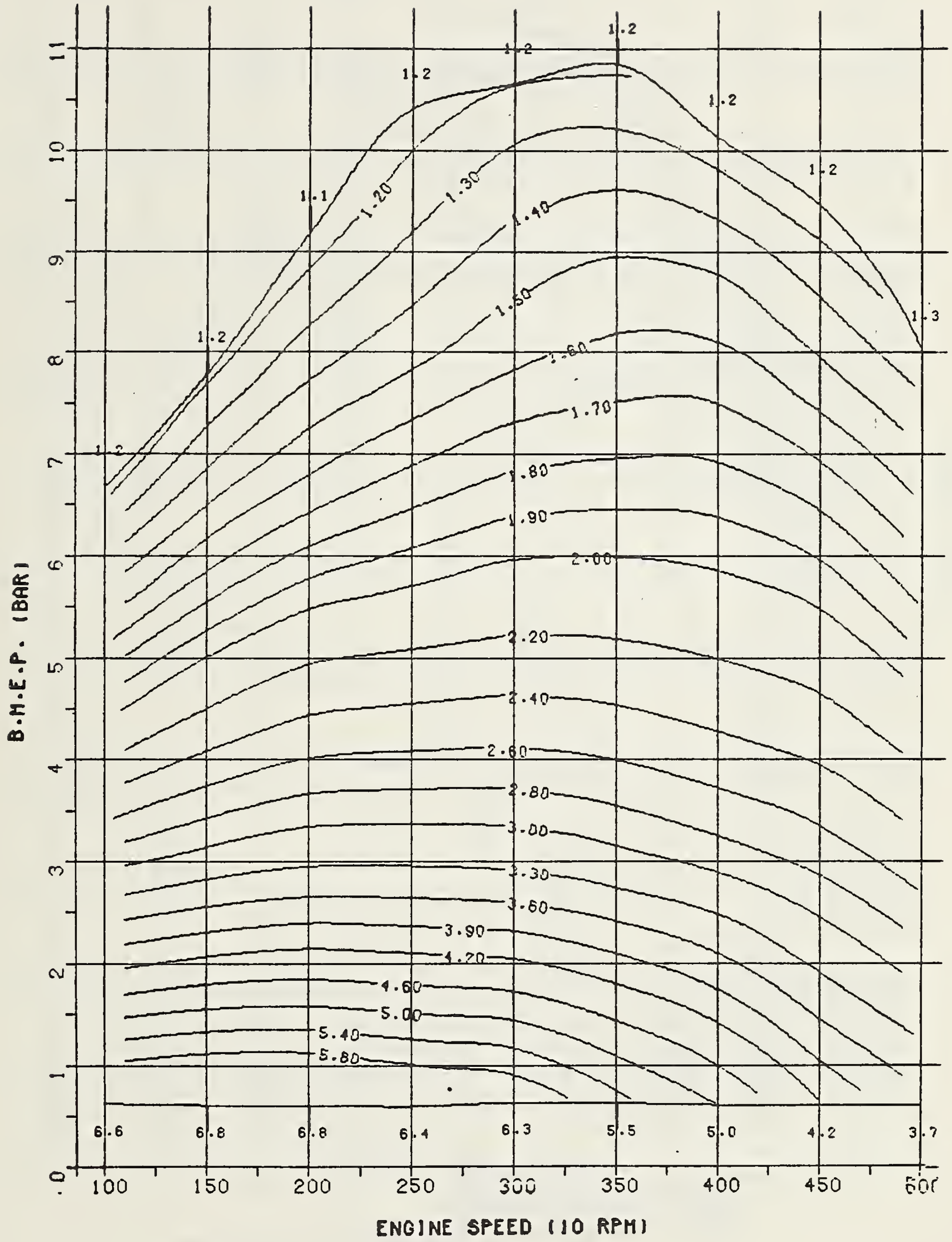
OIL TEMPERATURE (CELSIUS)
70 HP TC DIESEL WITH WATER INJECTION



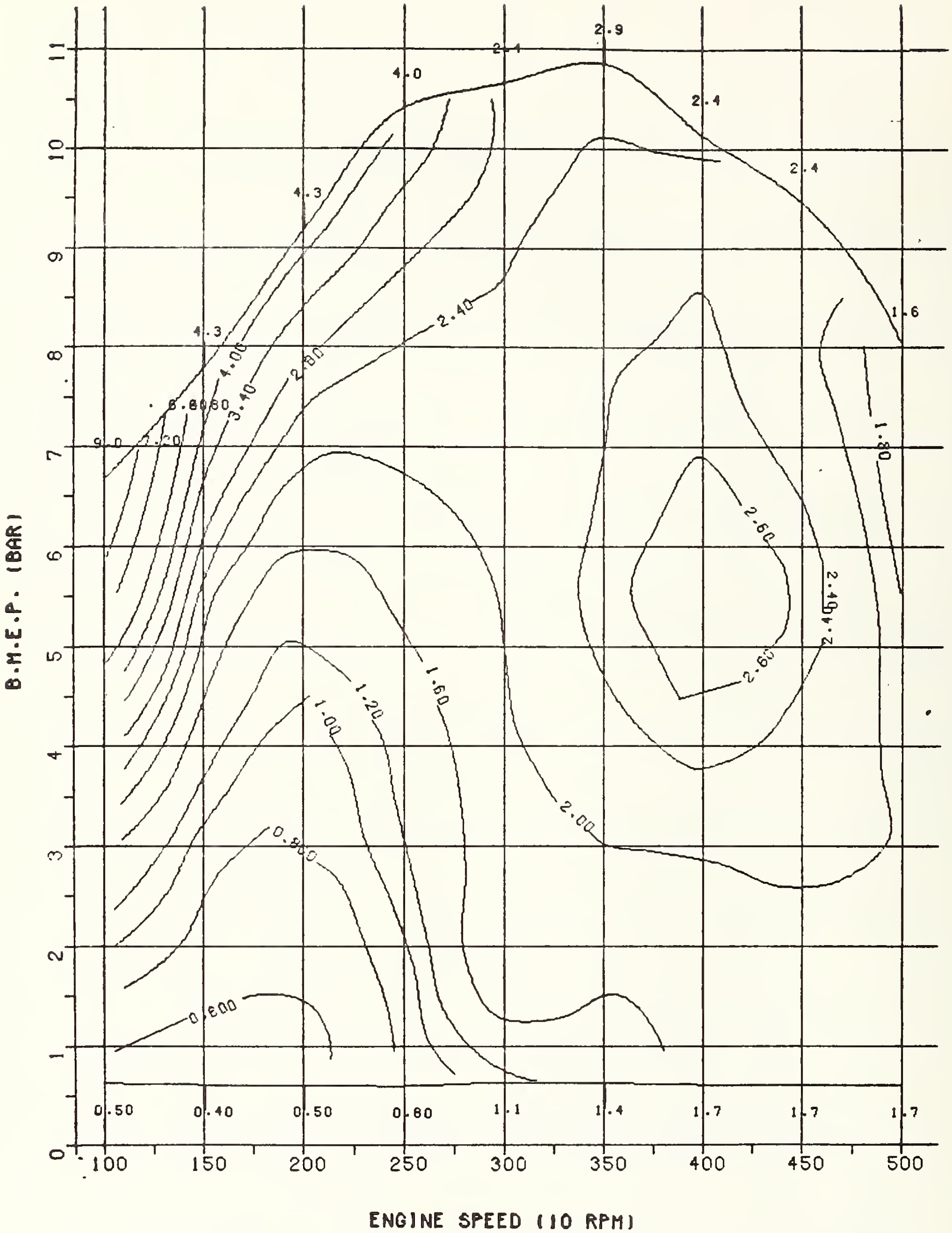
TURBOCHARGE PRESSURE (TORR)
70 HP TC DIESEL WITH WATER INJECTION



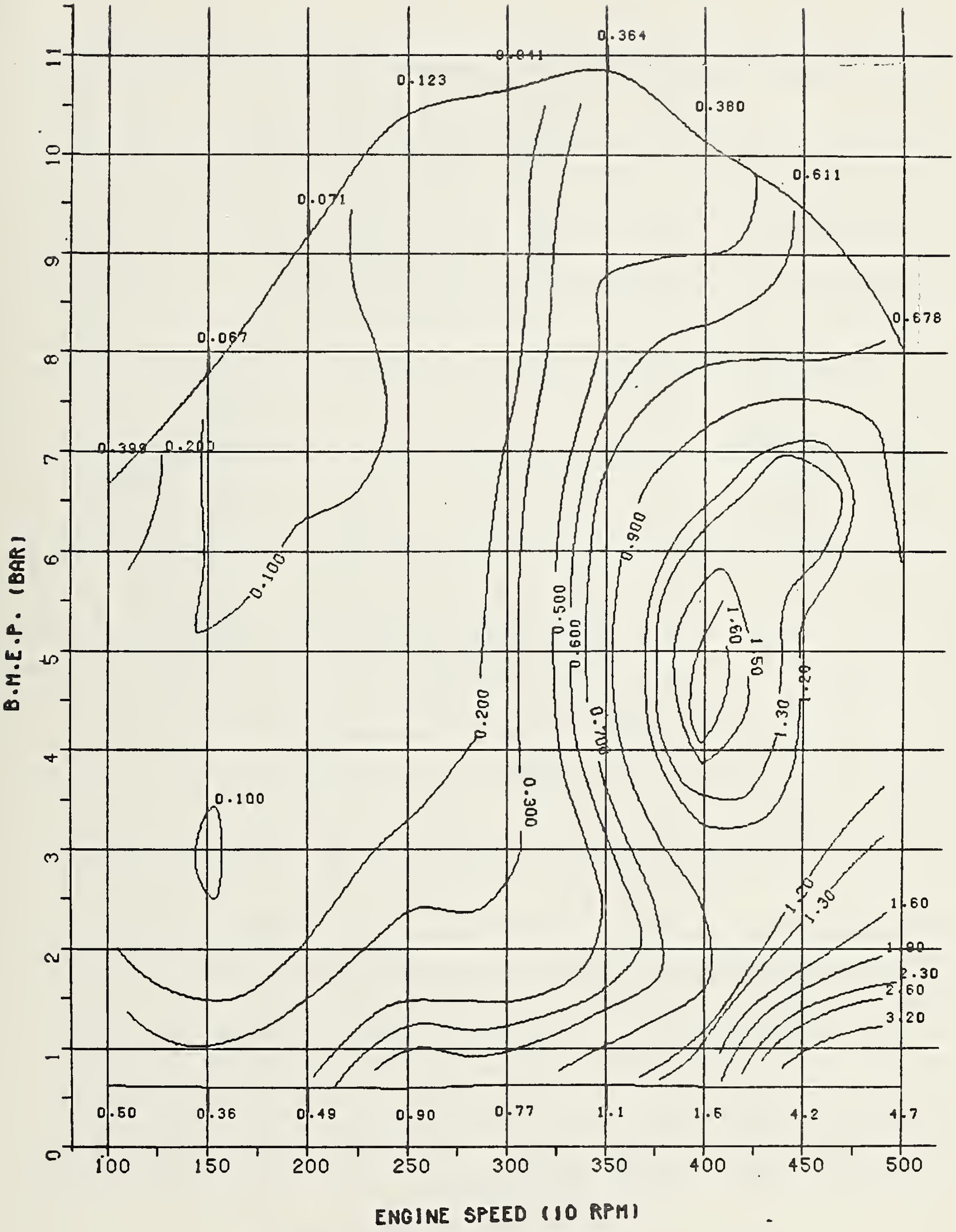
WATER TO FUEL RATIO (%)
70 HP TC DIESEL WITH WATER INJECTION



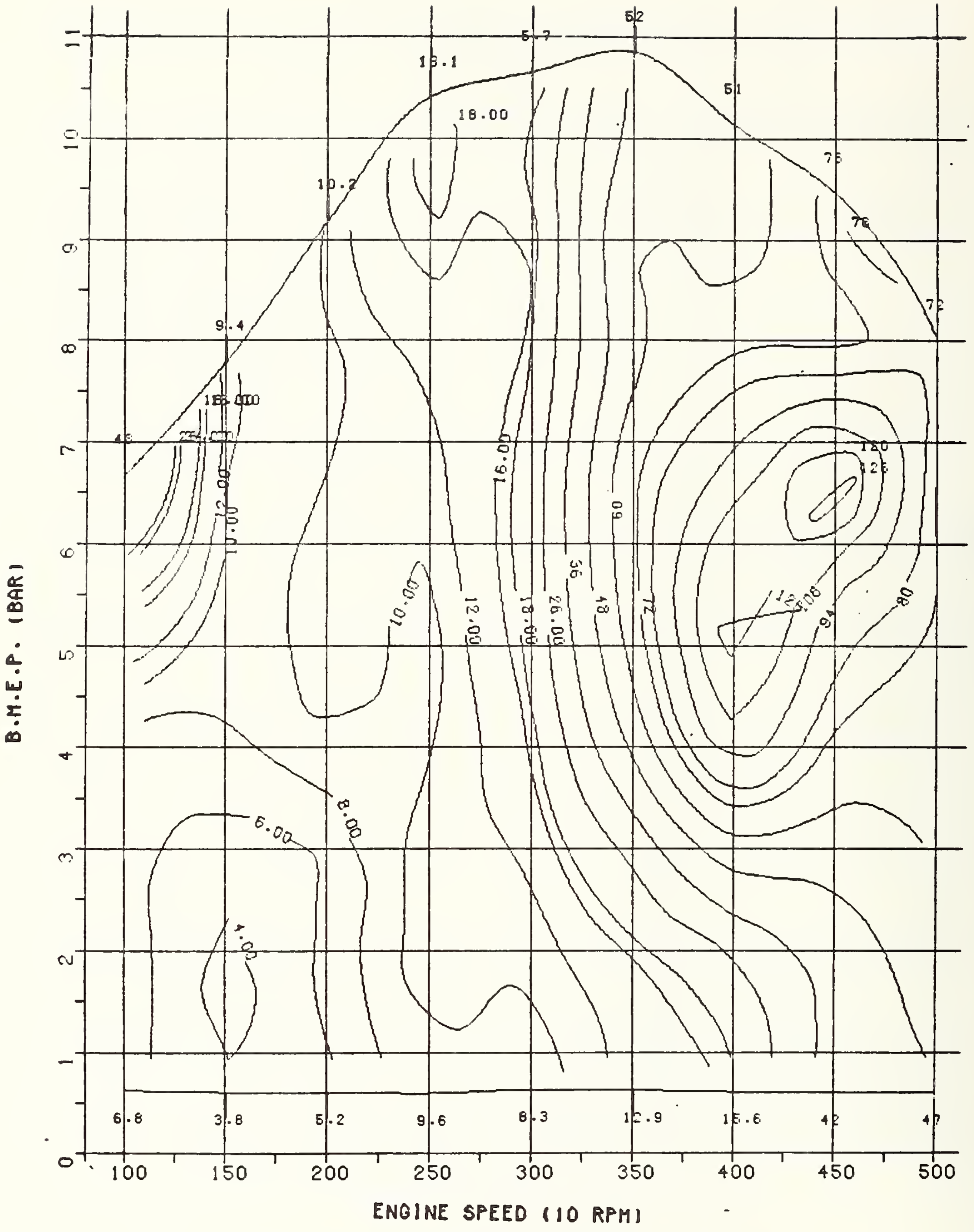
AIR TO FUEL RATIO
70 HP TC DIESEL WITH WATER INJECTION



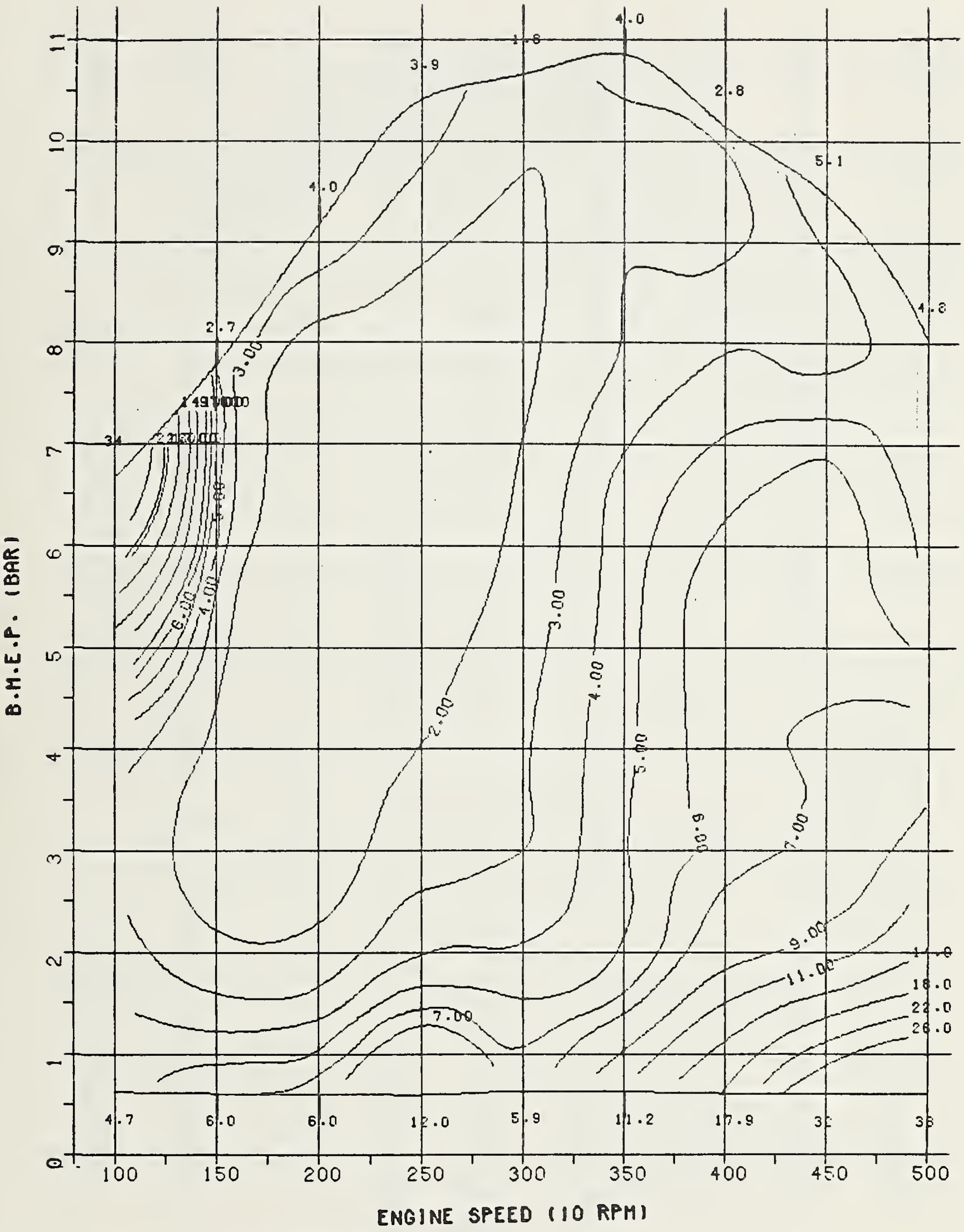
SMOKE (BOSCH NUMBER)
70 HP TC DIESEL WITH WATER INJECTION



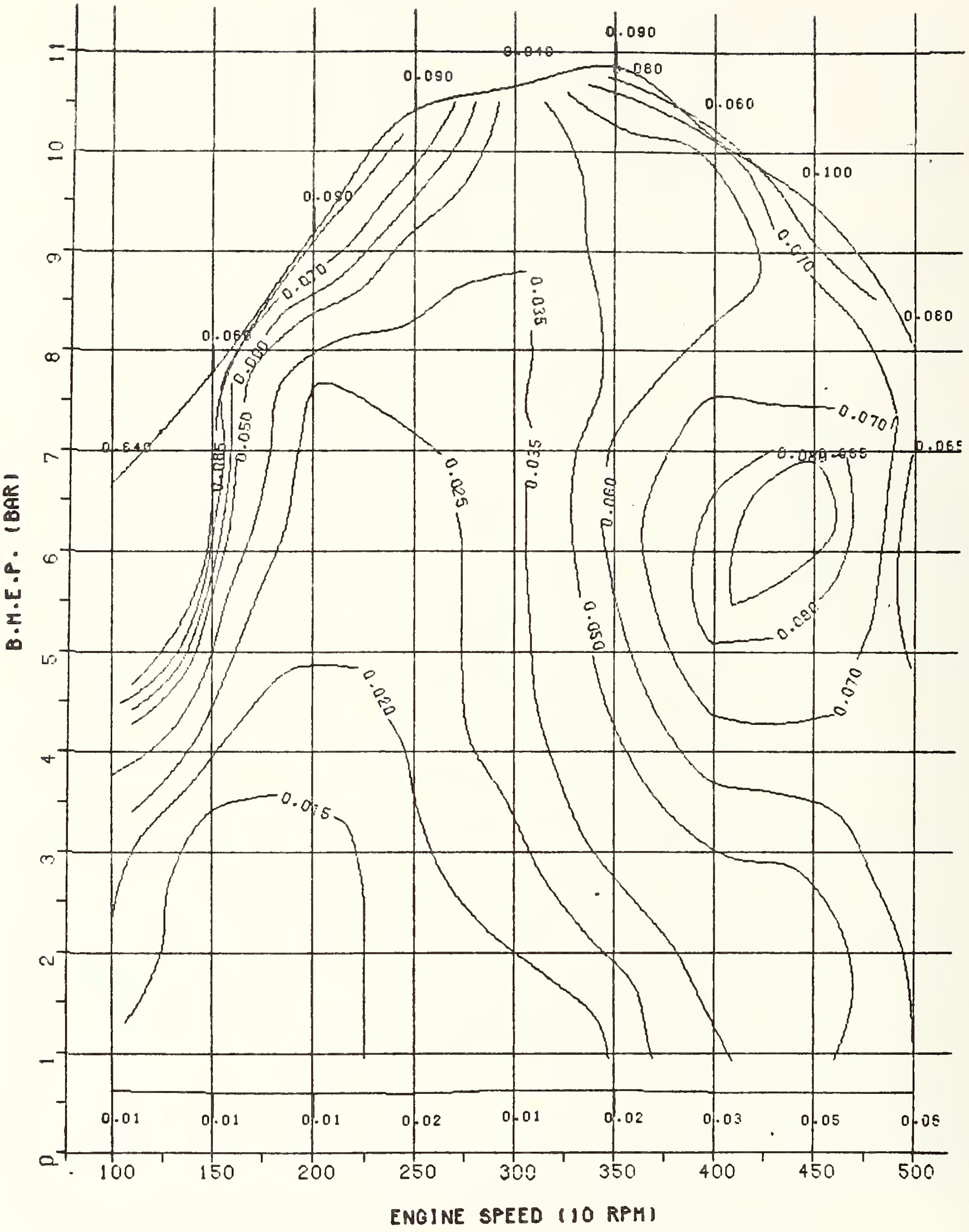
HC EMISSION (G/KWH)
70 HP TC DIESEL WITH WATER INJECTION



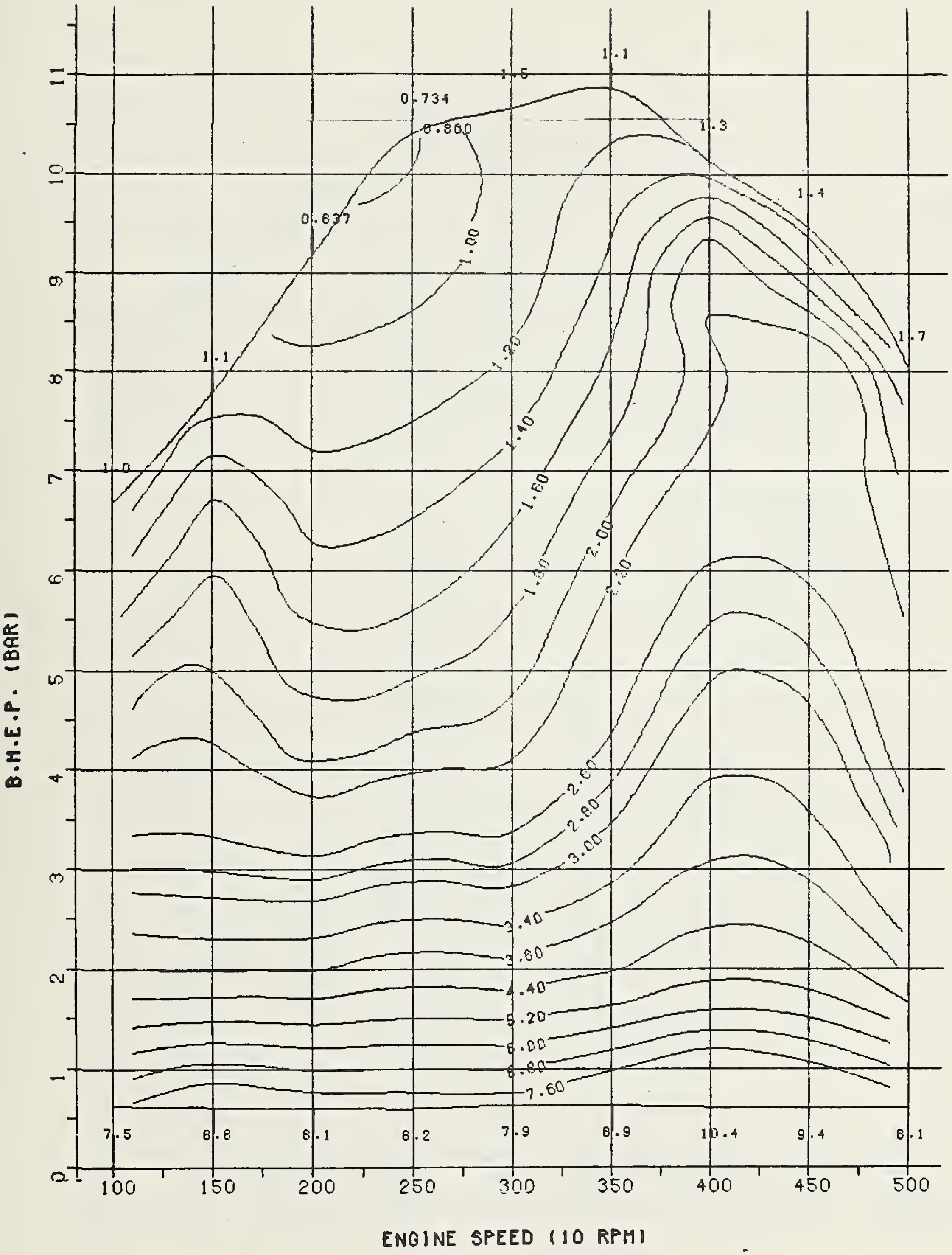
HC CONCENTRATION (PPM)
70 HP TC DIESEL WITH WATER INJECTION



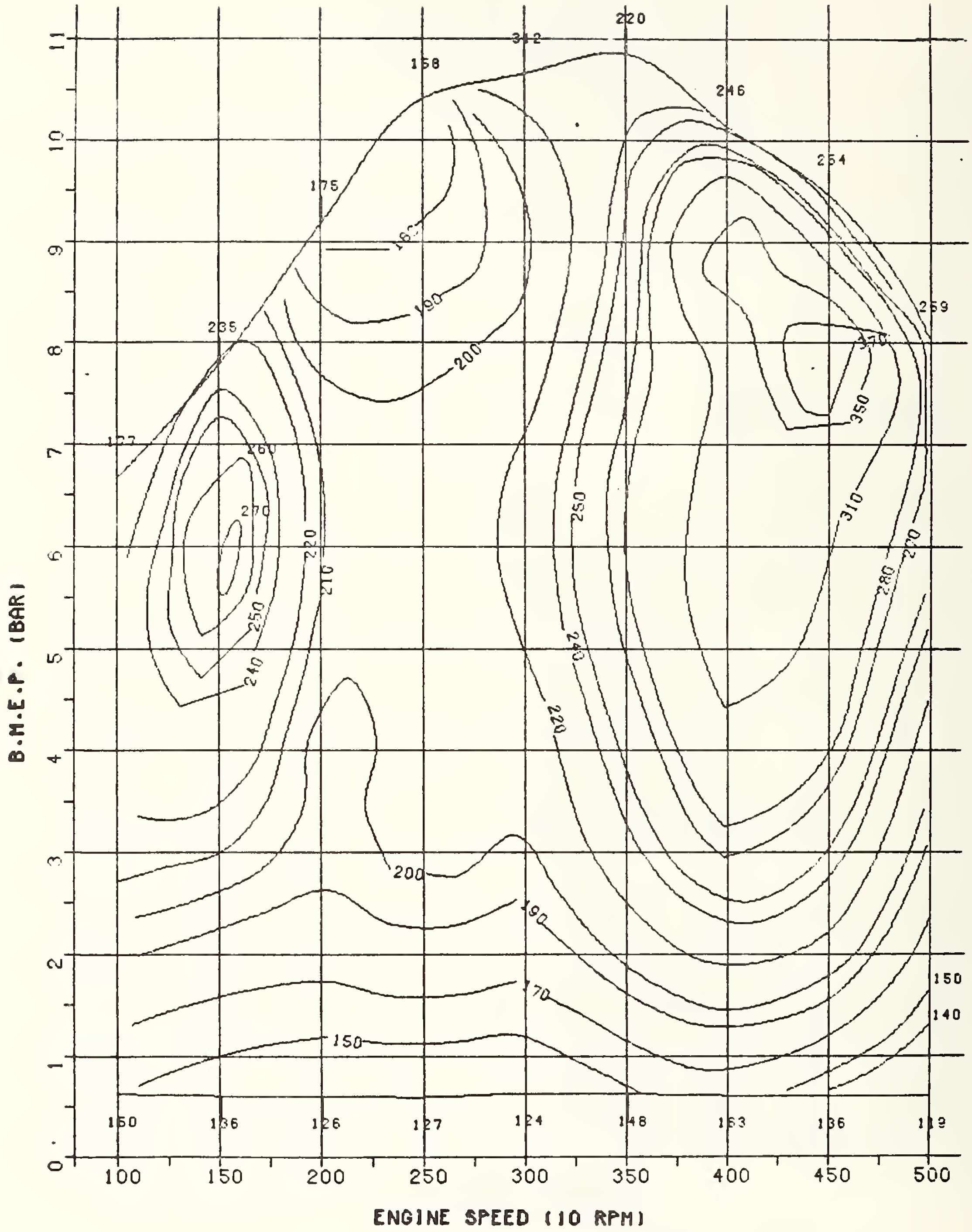
CO EMISSION (G/KWH)
70 HP TC DIESEL WITH WATER INJECTION



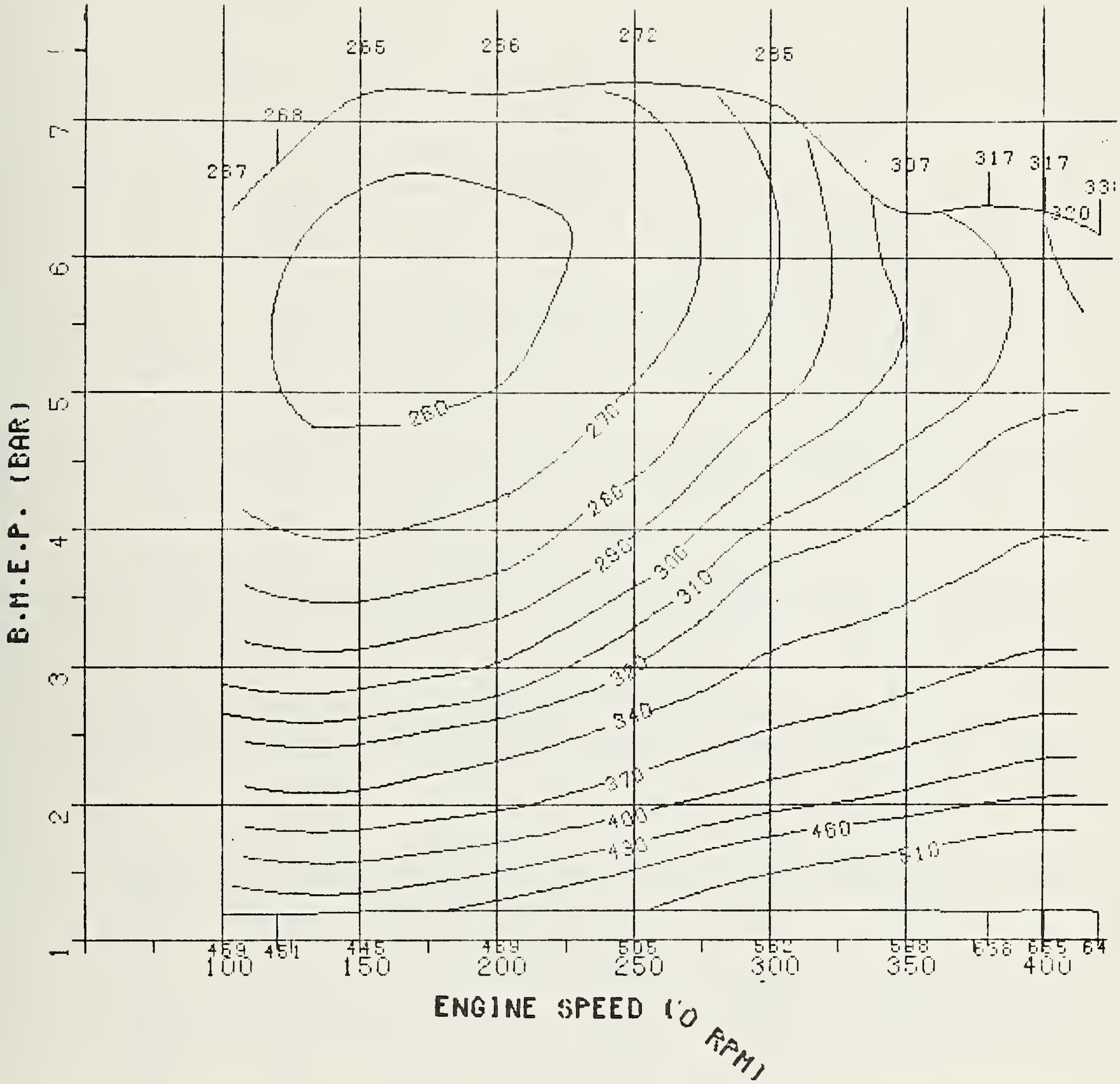
CO CONCENTRATION (%)
70 HP TC DIESEL WITH WATER INJECTION



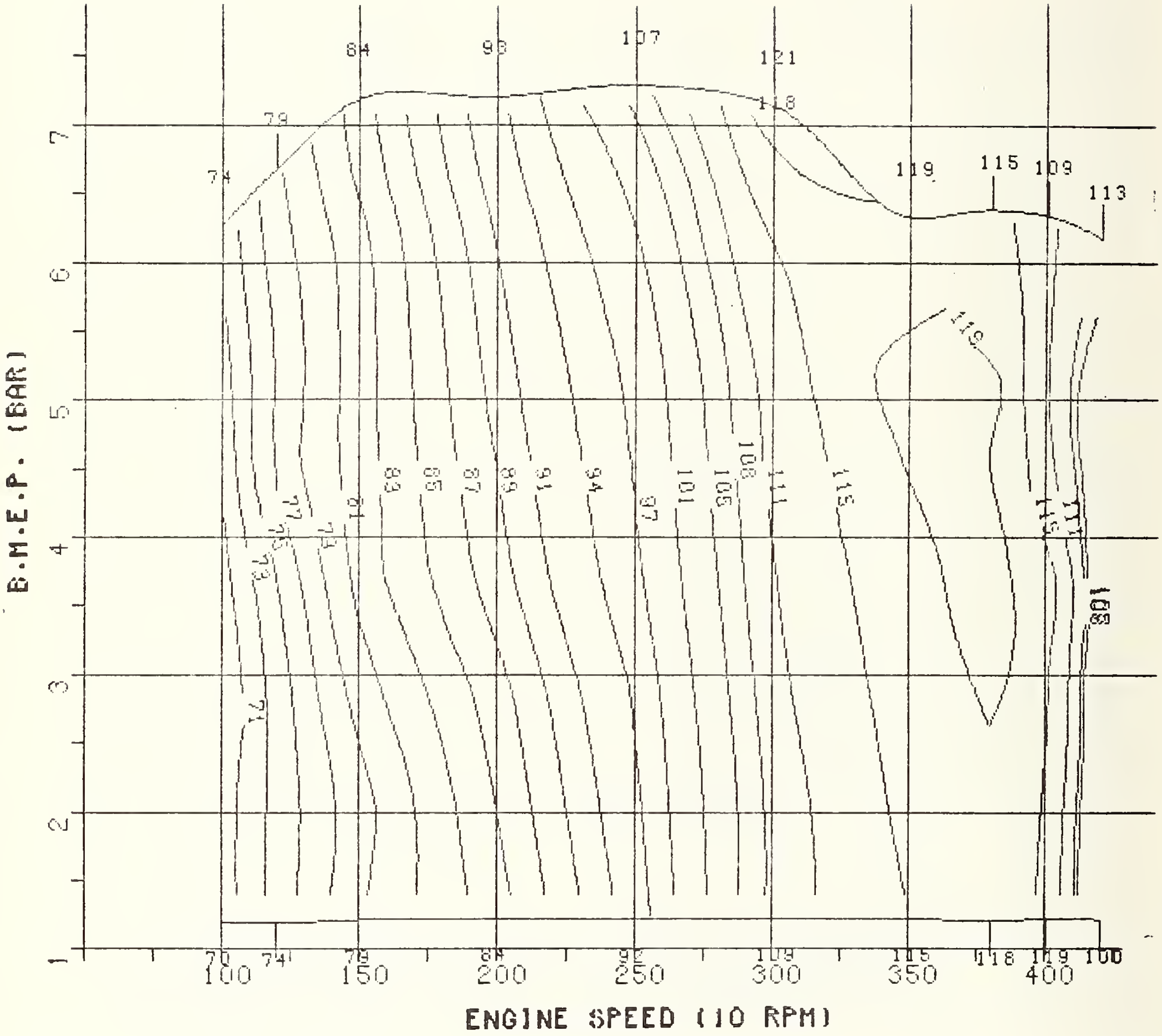
NO EMISSION (G/KWH)
70 HP TC DIESEL WITH WATER INJECTION



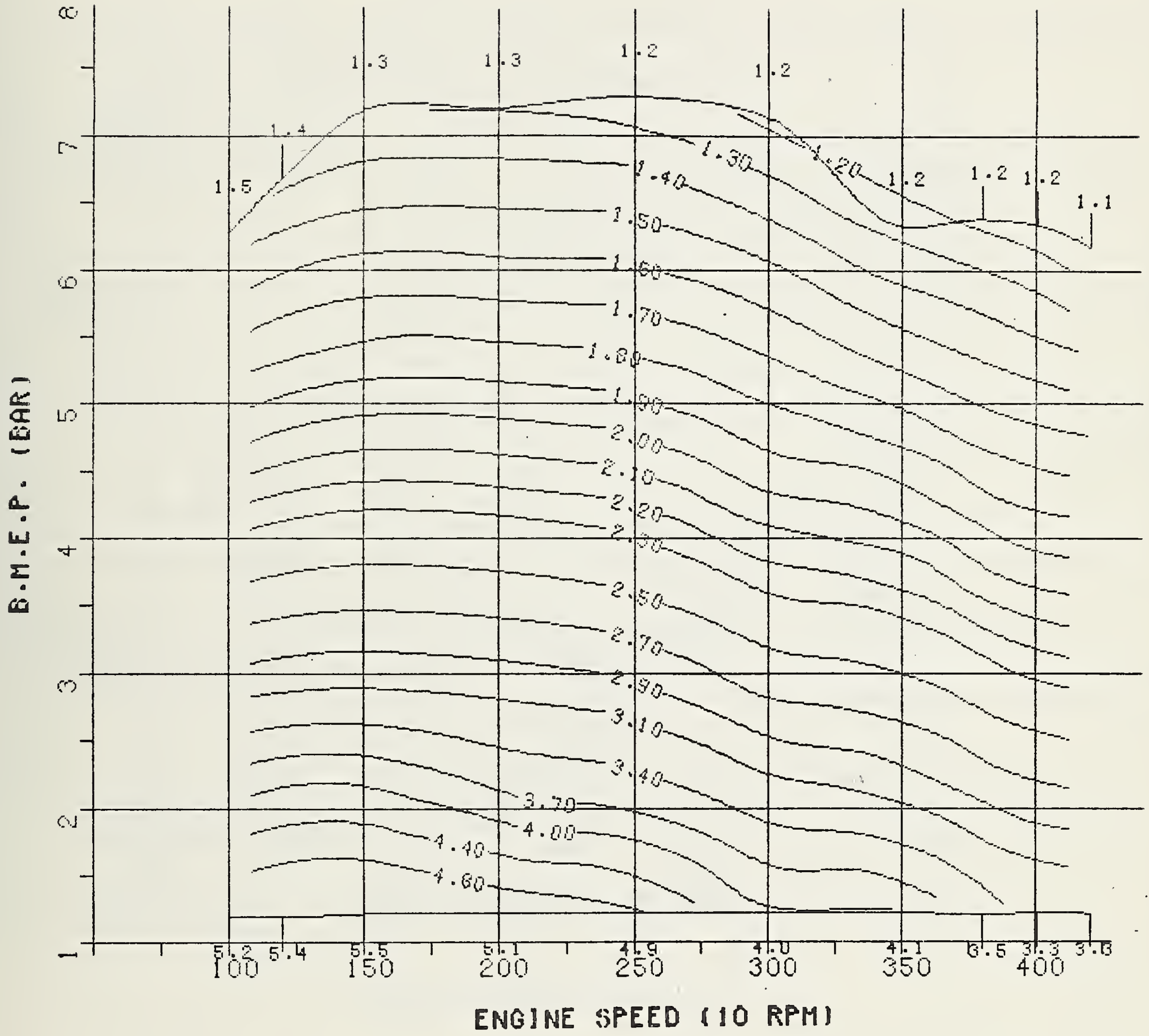
NO CONCENTRATION (PPM)



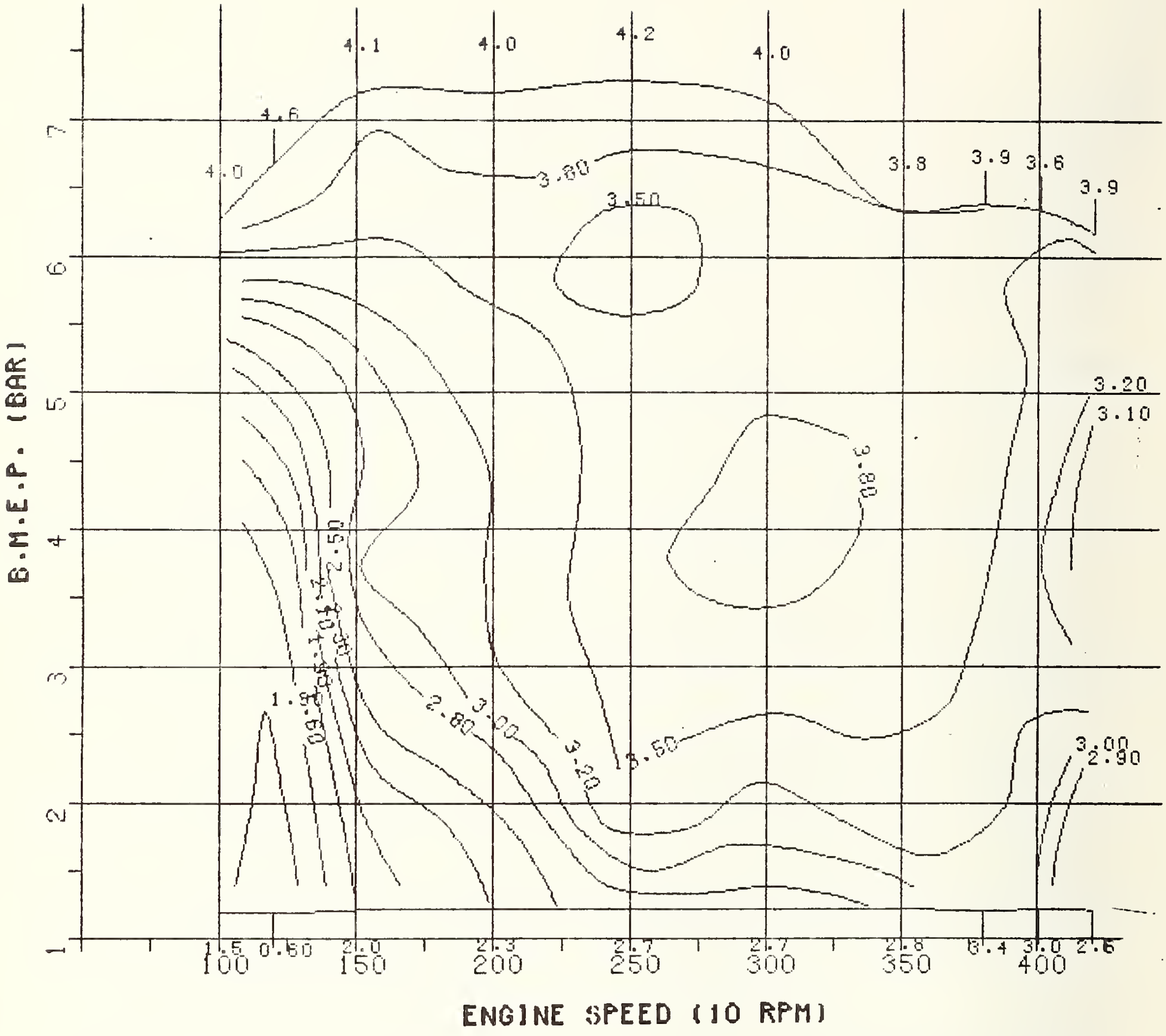
SPECIFIC FUEL CONSUMPTION (G/KWH)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



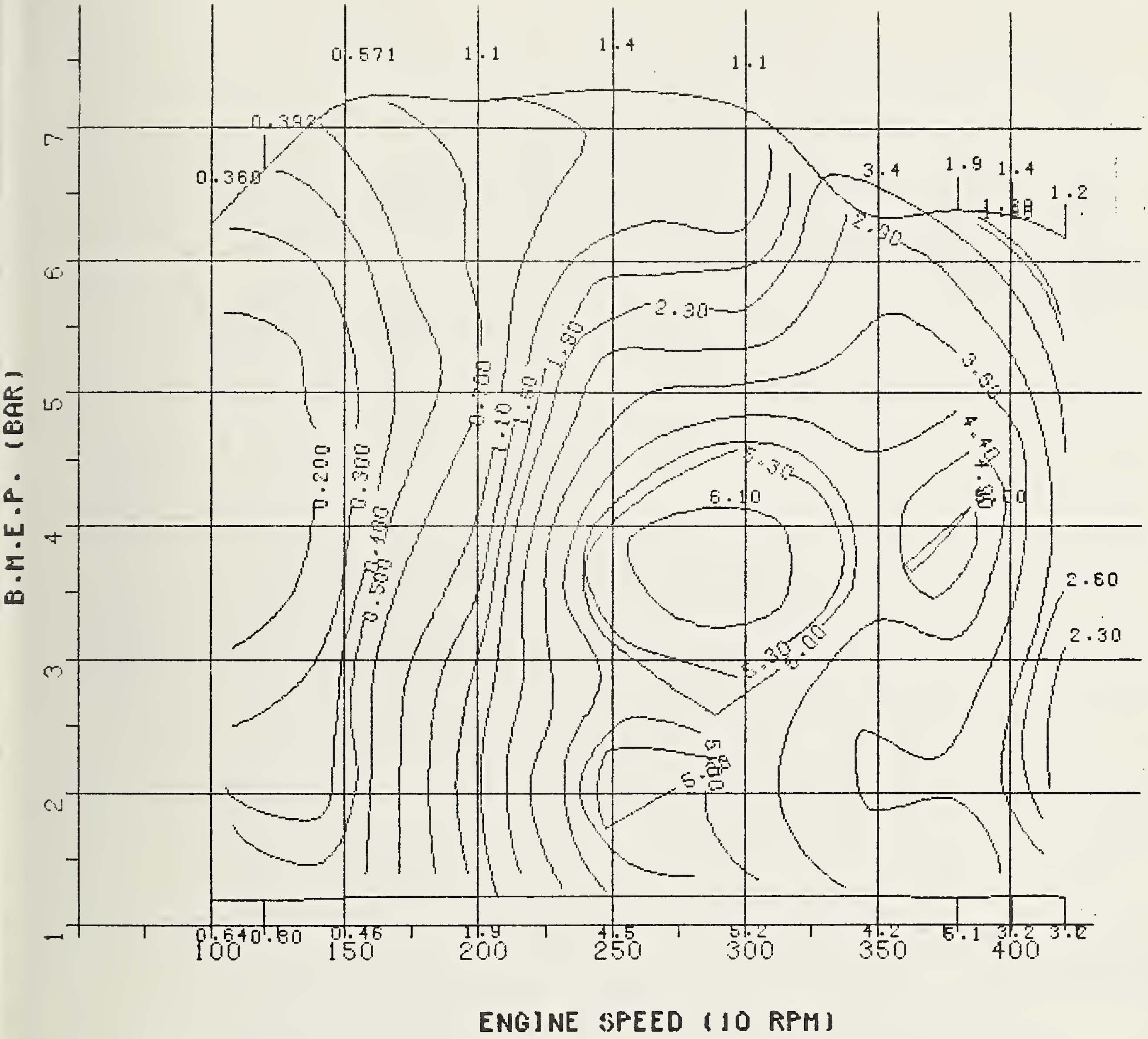
OIL TEMPERATURE (CELSIUS)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



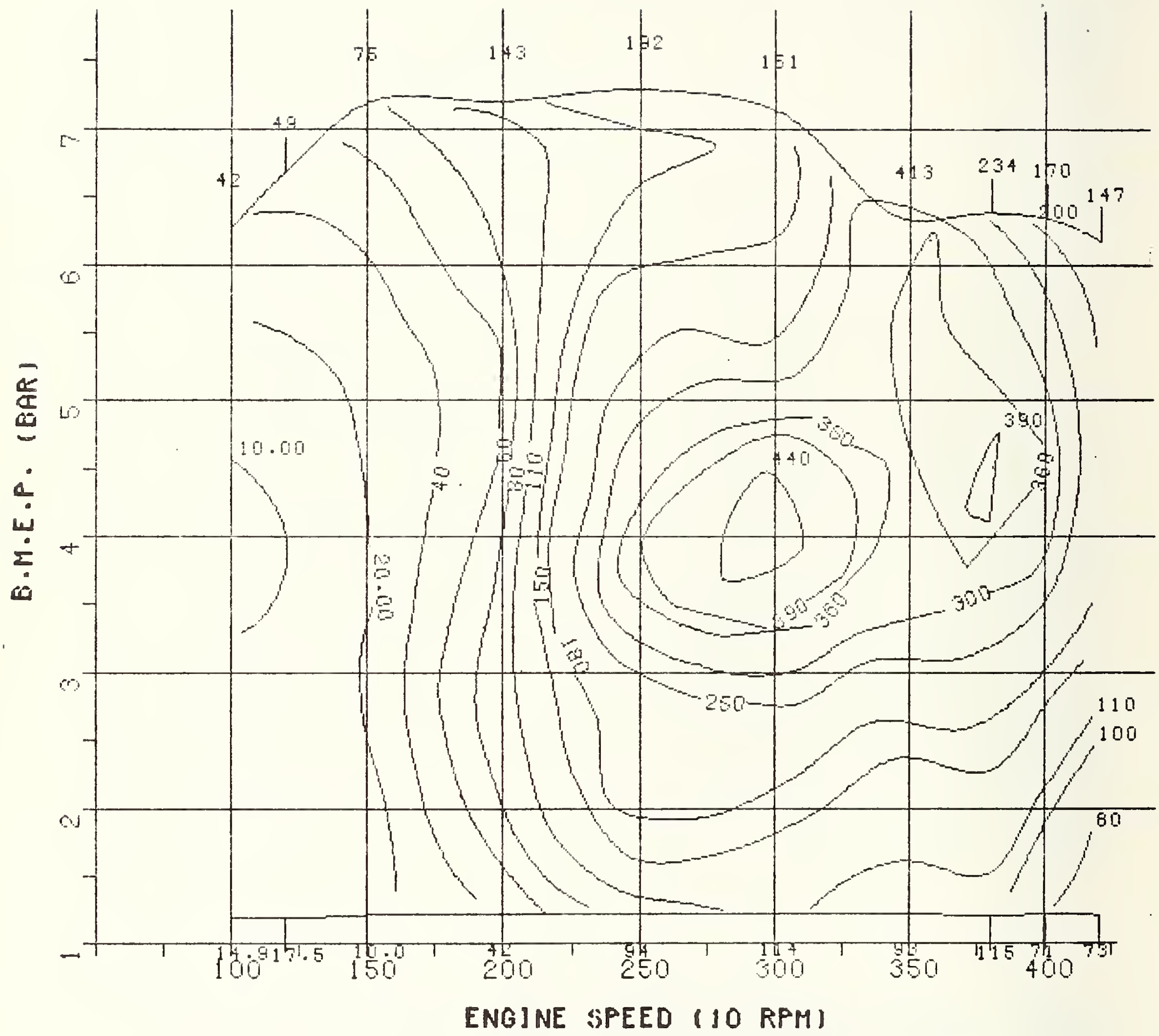
AIR TO FUEL RATIO
5 CYLINDER 130 CID N.A. DIESEL ENGINE



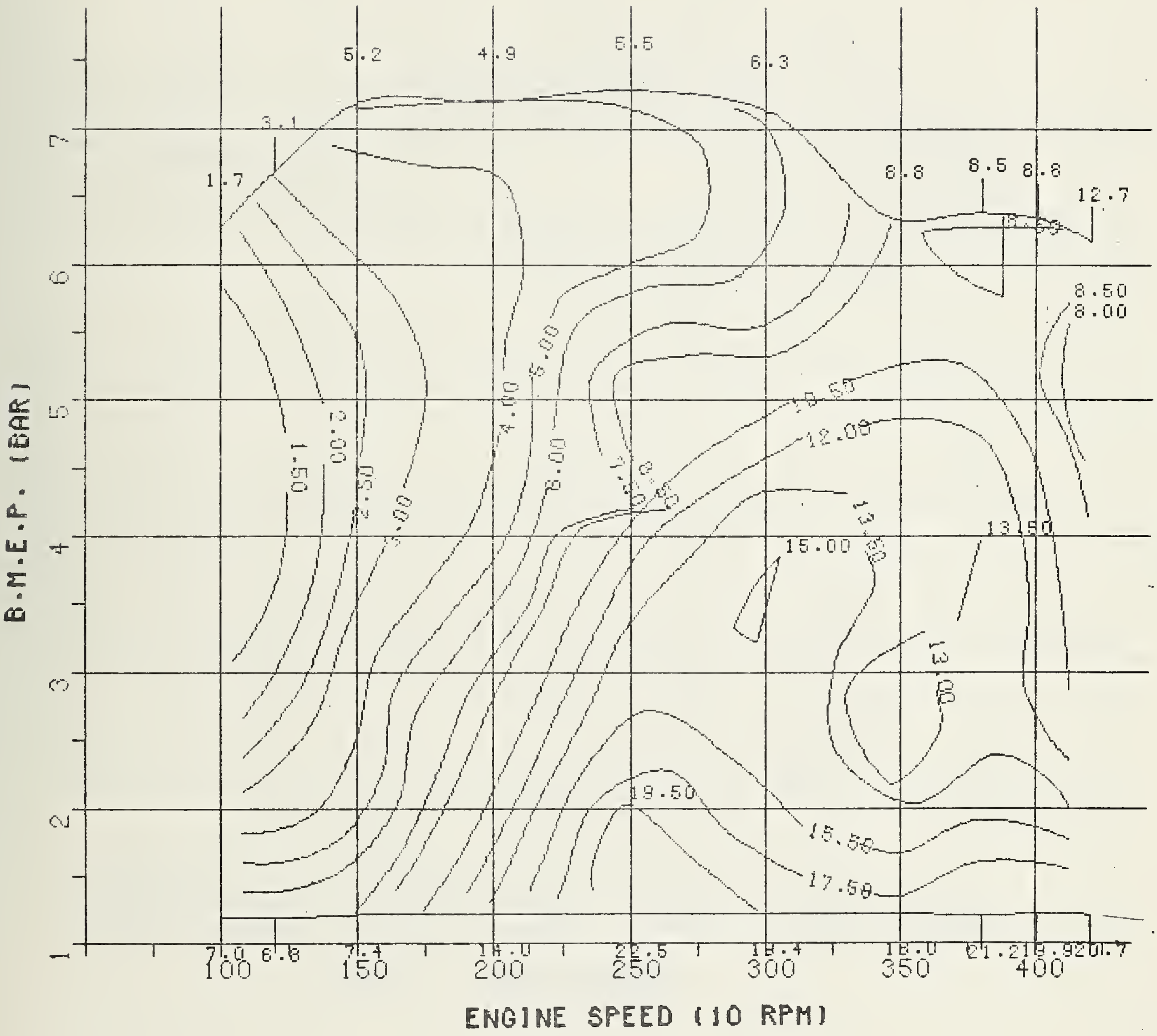
SMOKE (BOSCH NUMBER)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



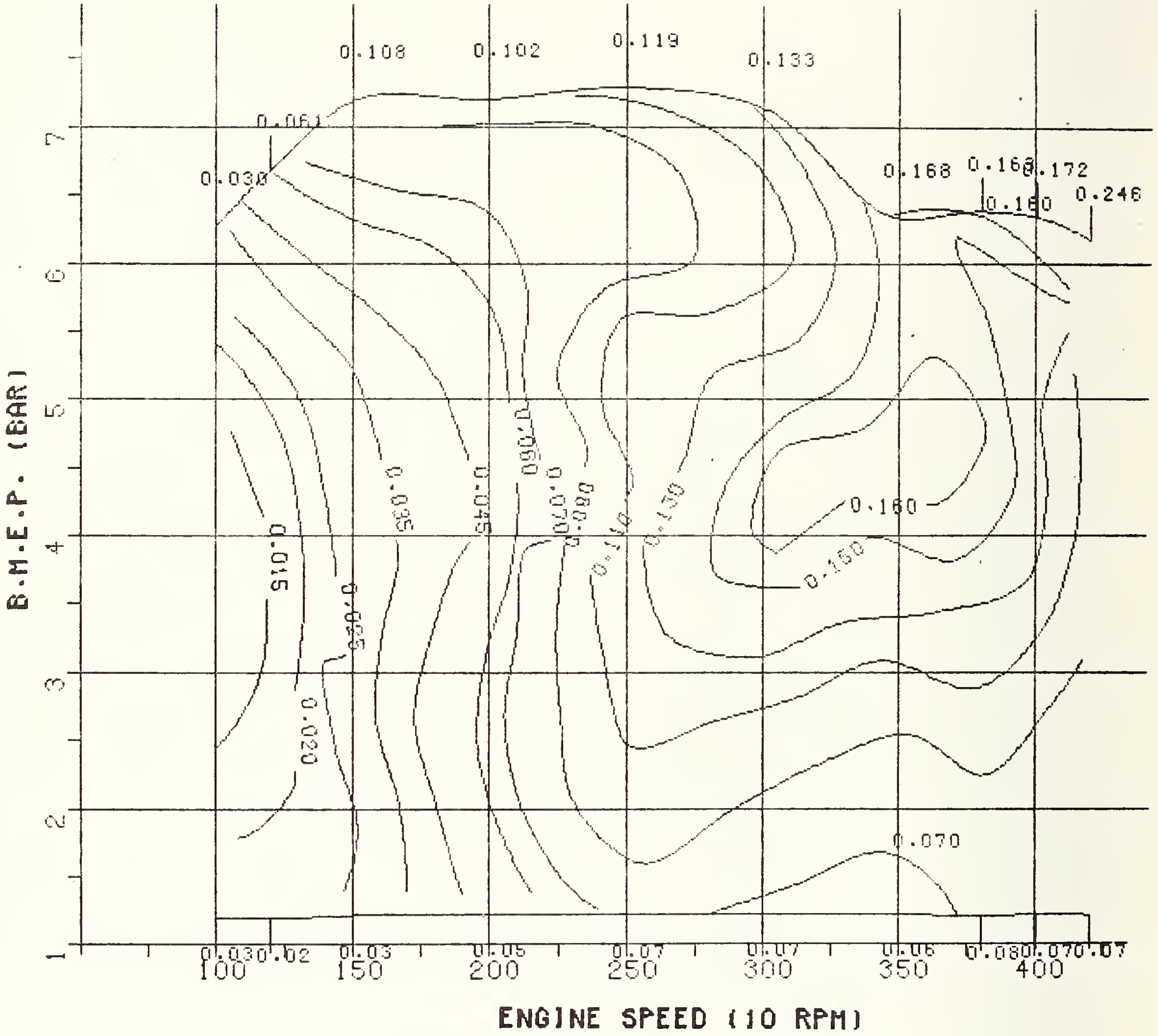
HC EMISSION (G/KWH)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



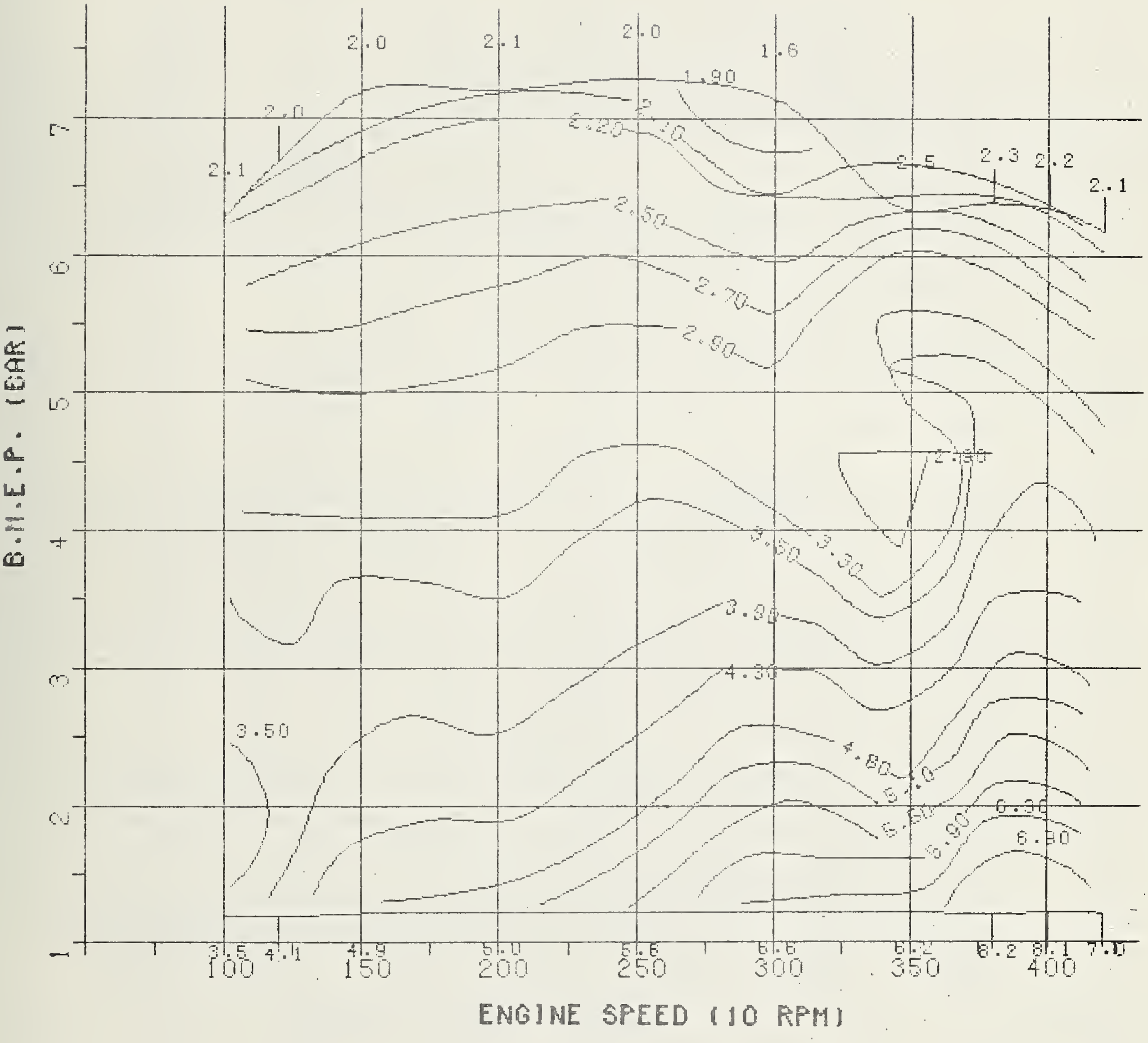
HC CONCENTRATION (PPM)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



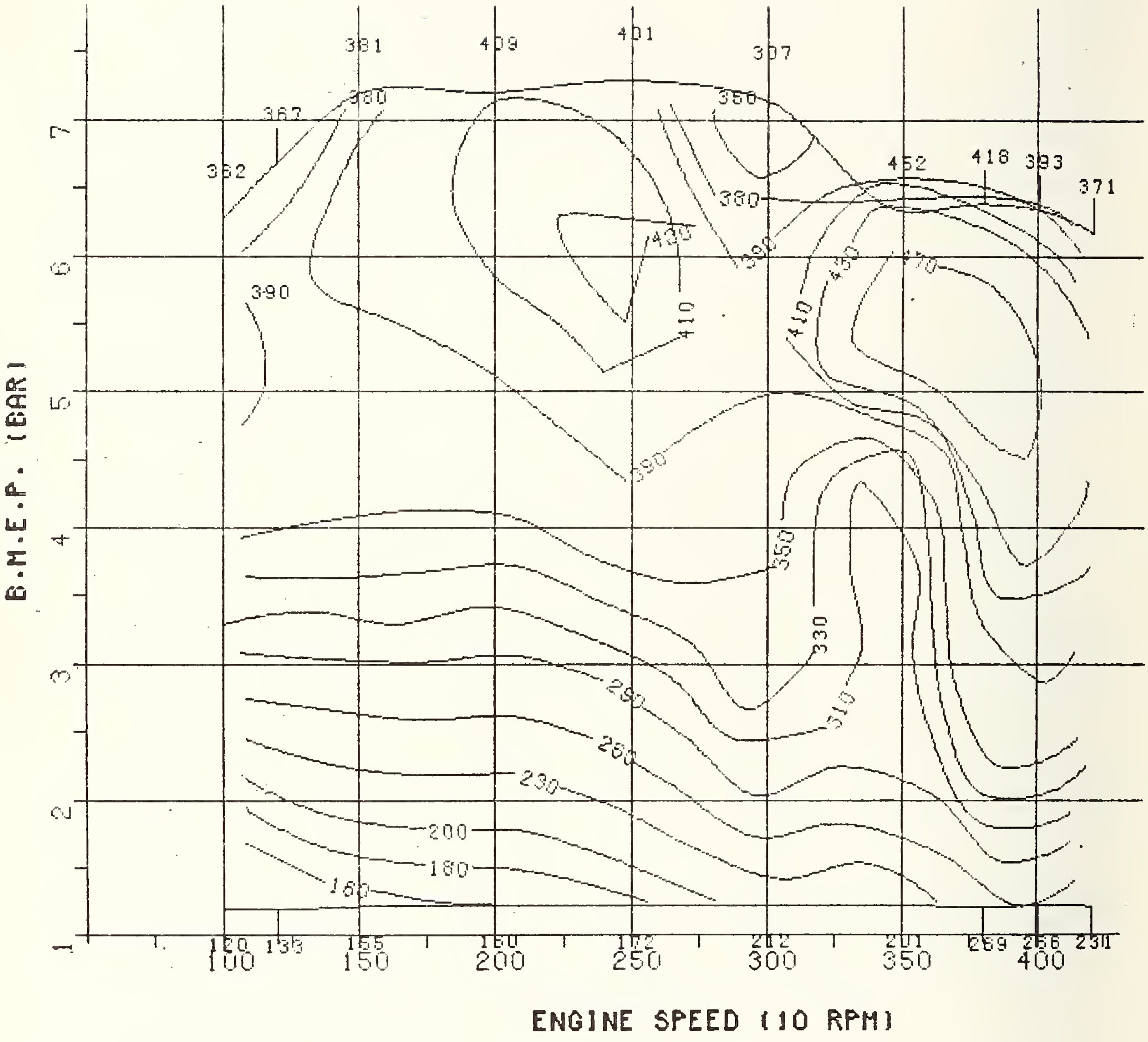
CO EMISSION (G/KWH)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



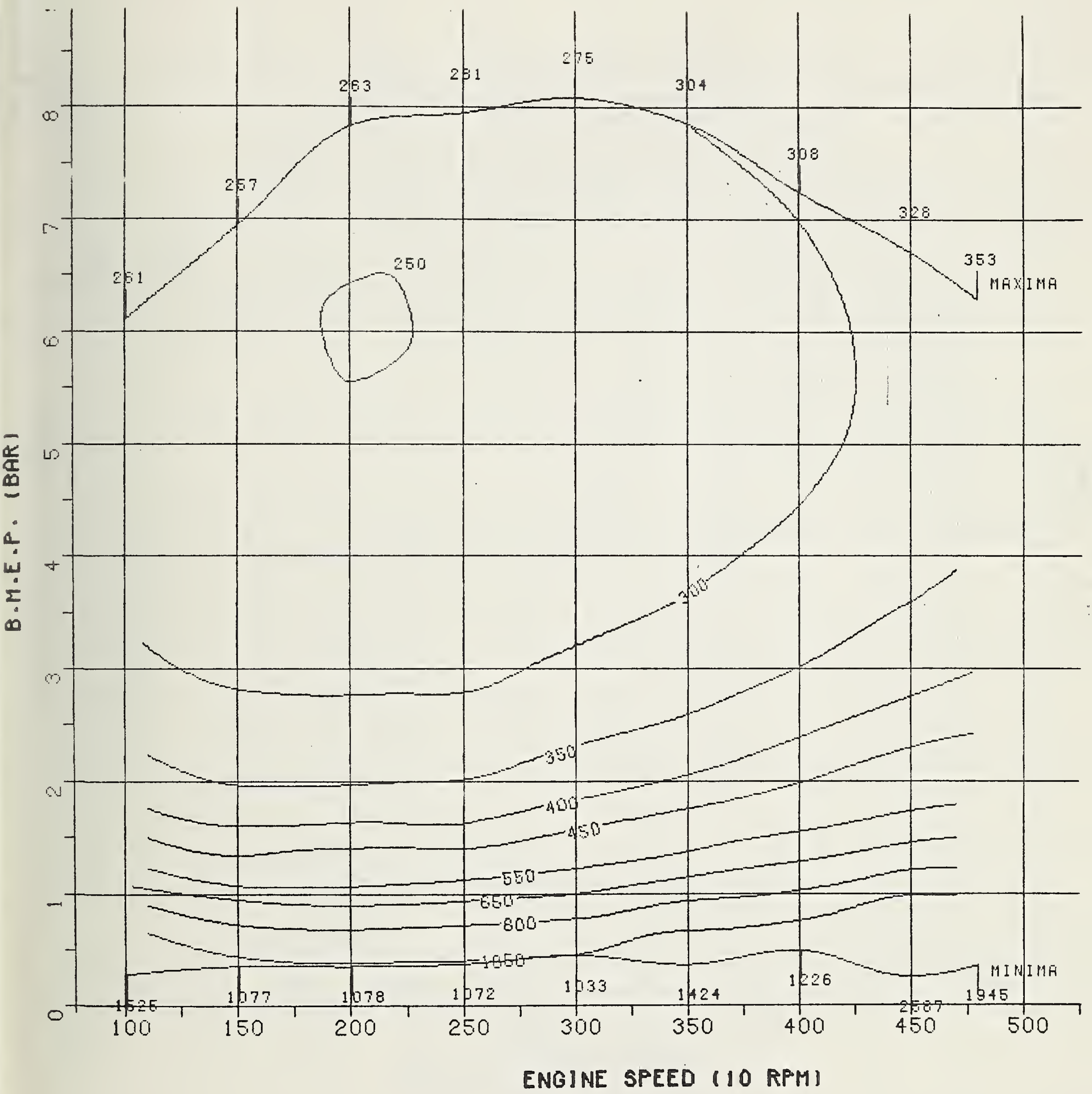
CO CONCENTRATION (%)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



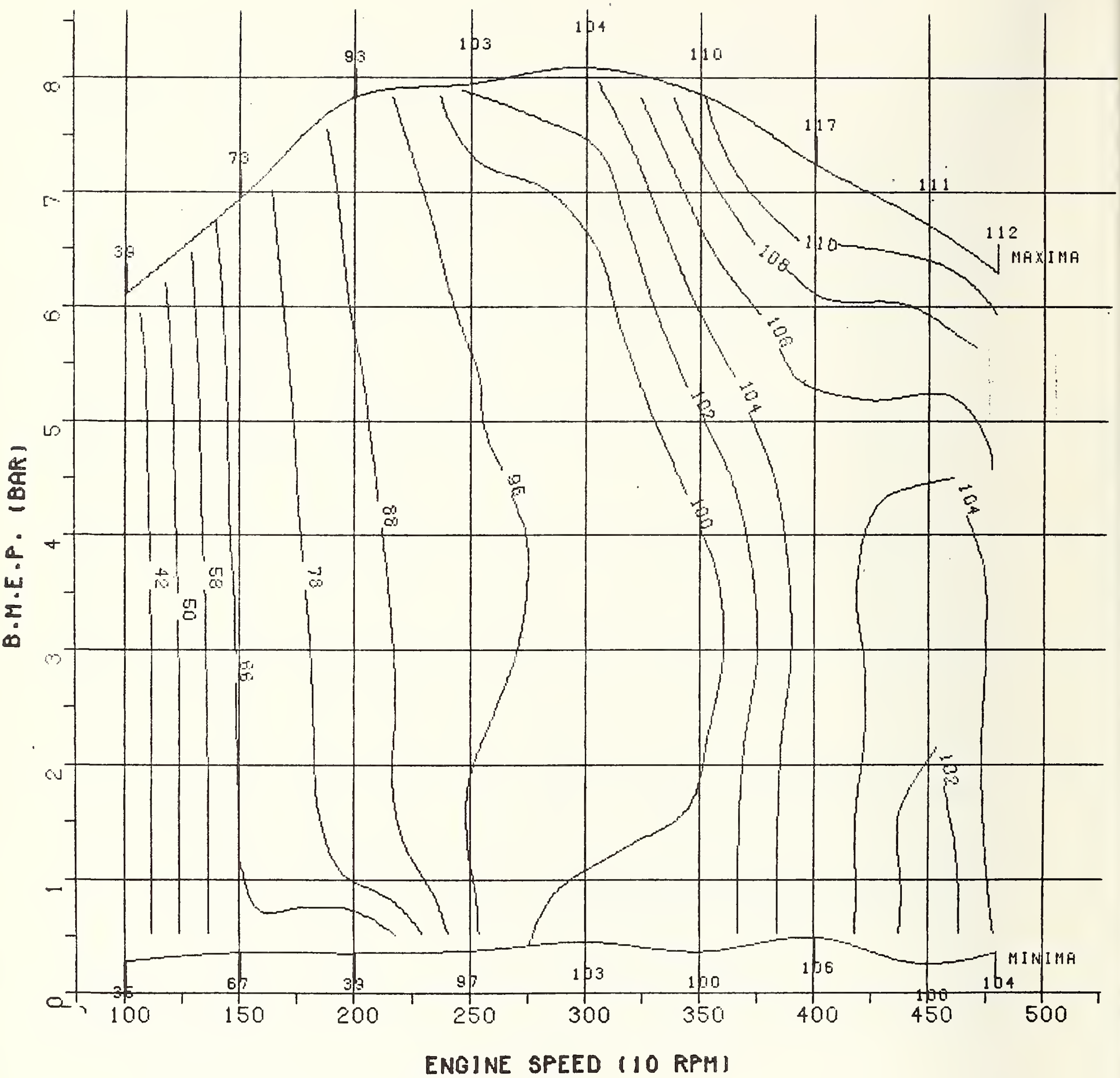
NO EMISSION (G/KWH)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



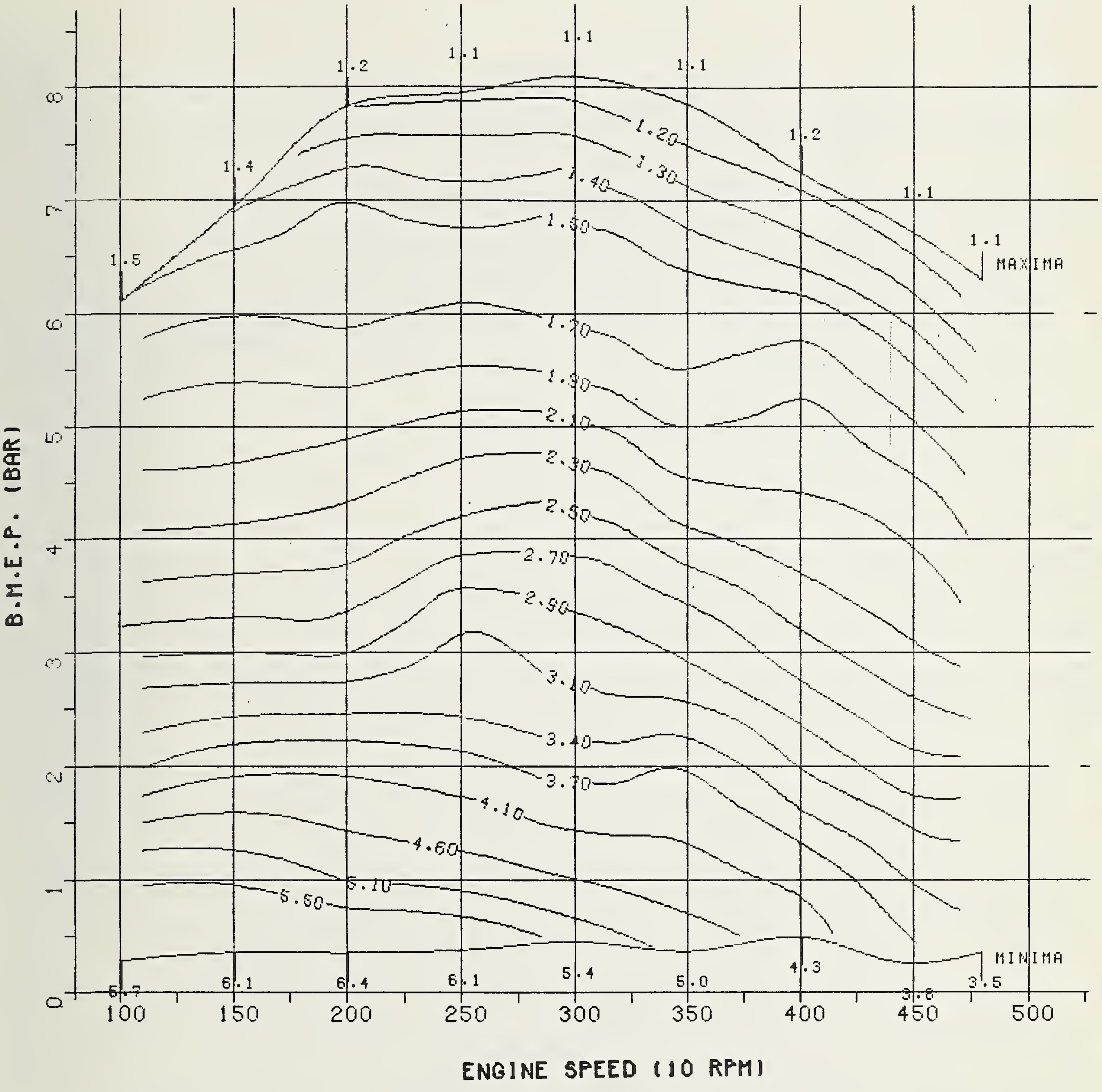
NO CONCENTRATION (PPM)
5 CYLINDER 130 CID N.A. DIESEL ENGINE



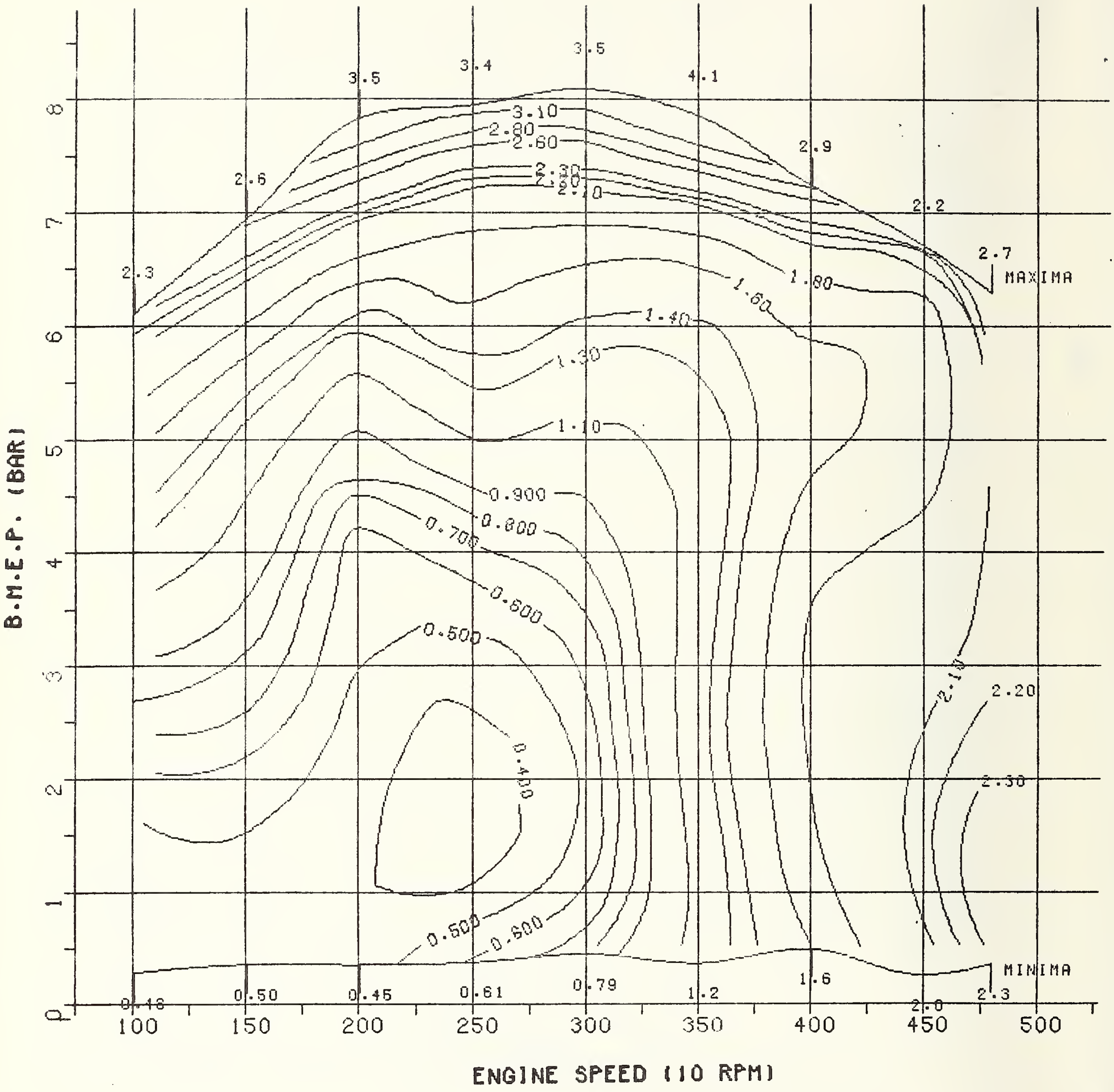
SPECIFIC FUEL CONSUMPTION (G/KWH)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



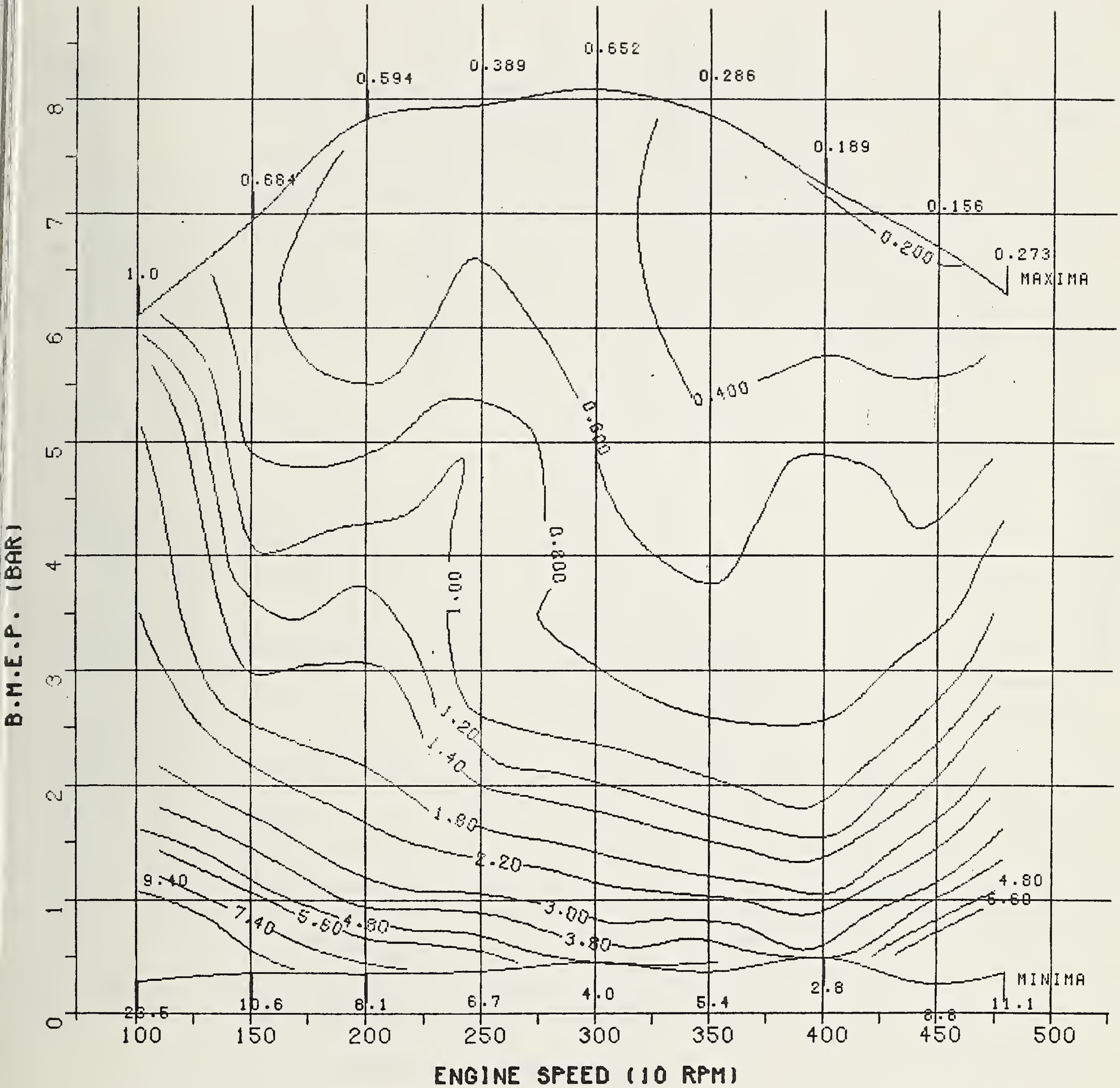
OIL TEMPERATURE (CELSIUS)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



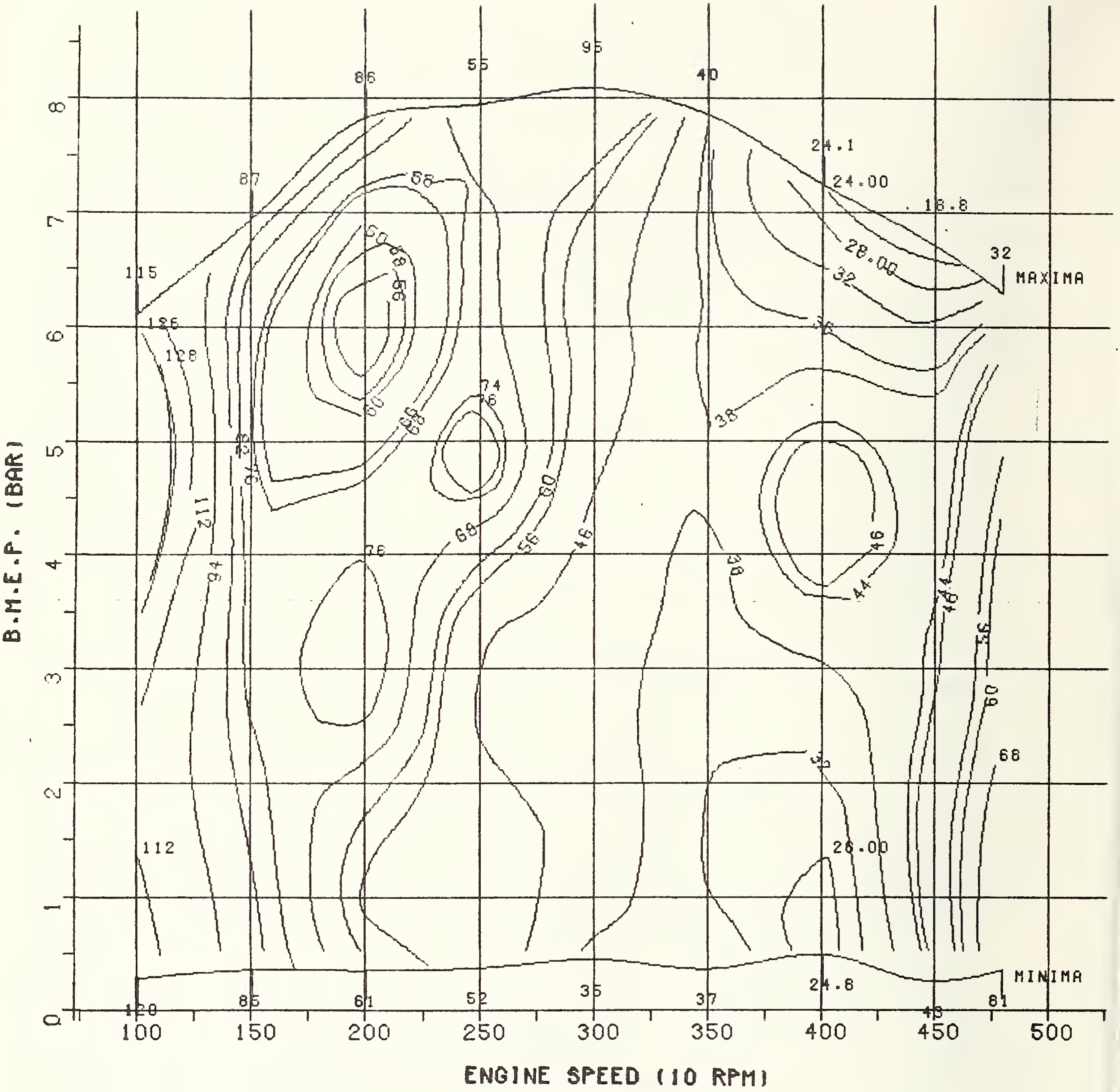
AIR TO FUEL RATIO
6 CYLINDER 146 CID N.A. DIESEL ENGINE



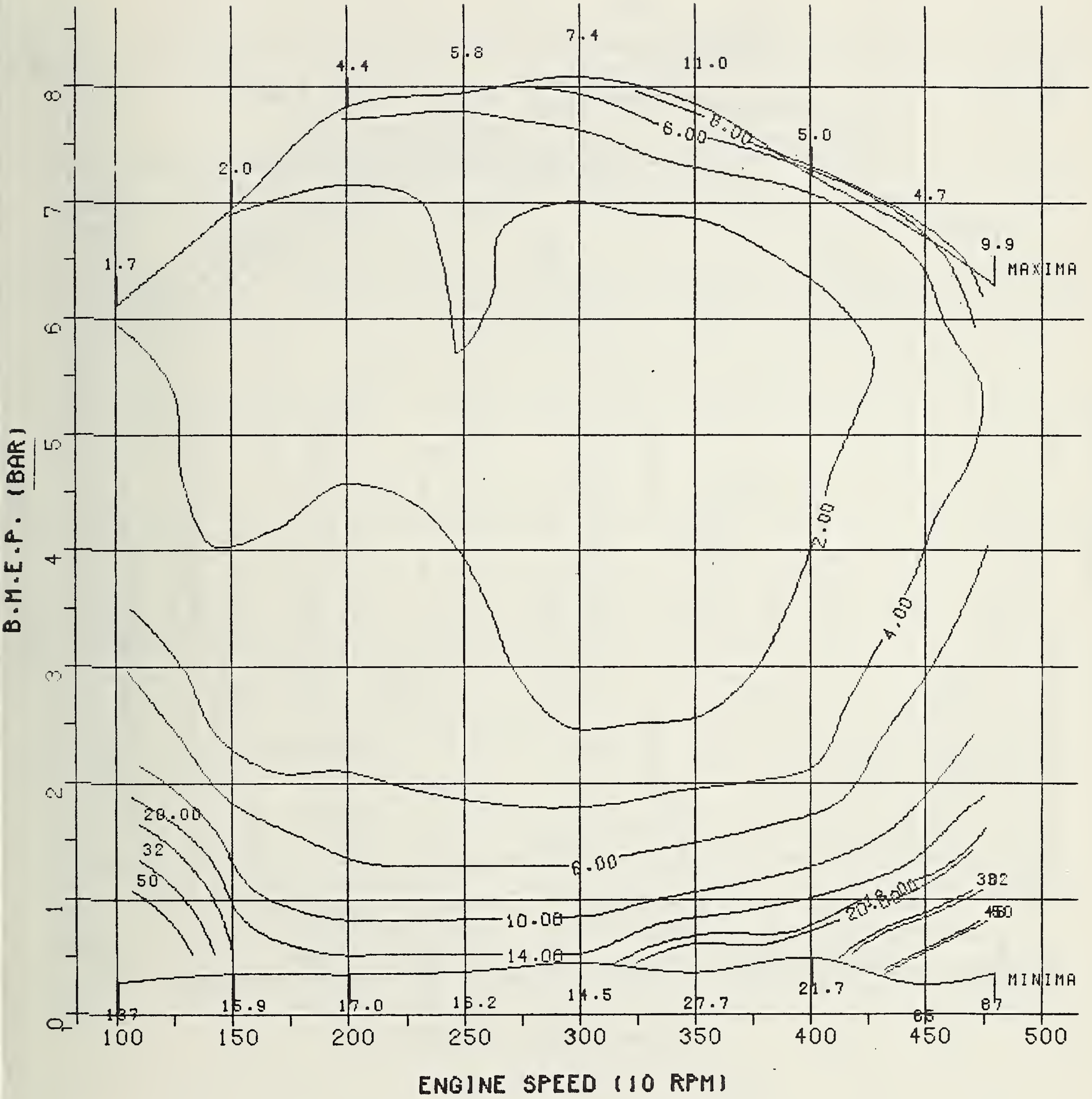
SMOKE (BOSCH NUMBER)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



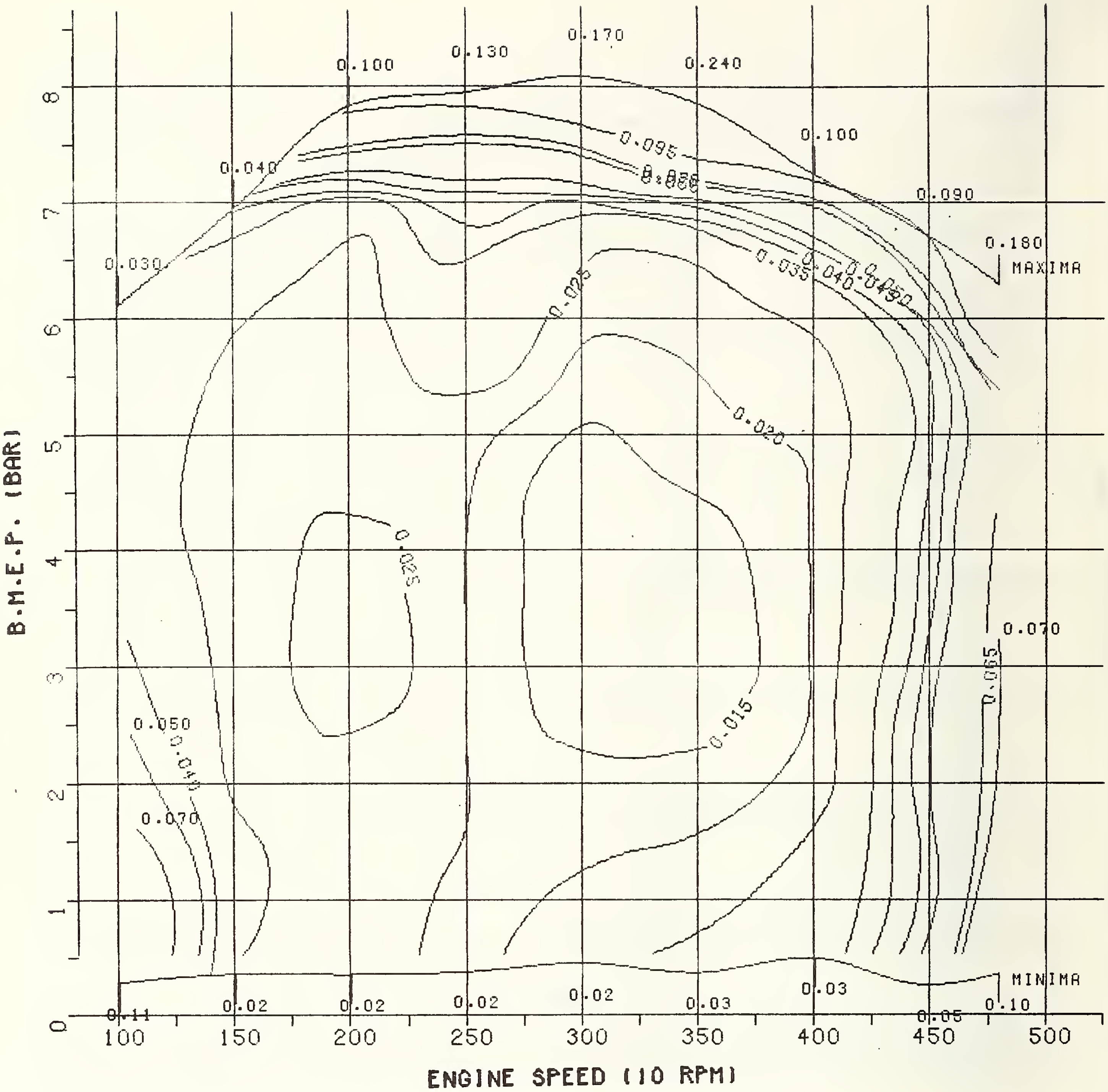
HC EMISSION (G/KWH)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



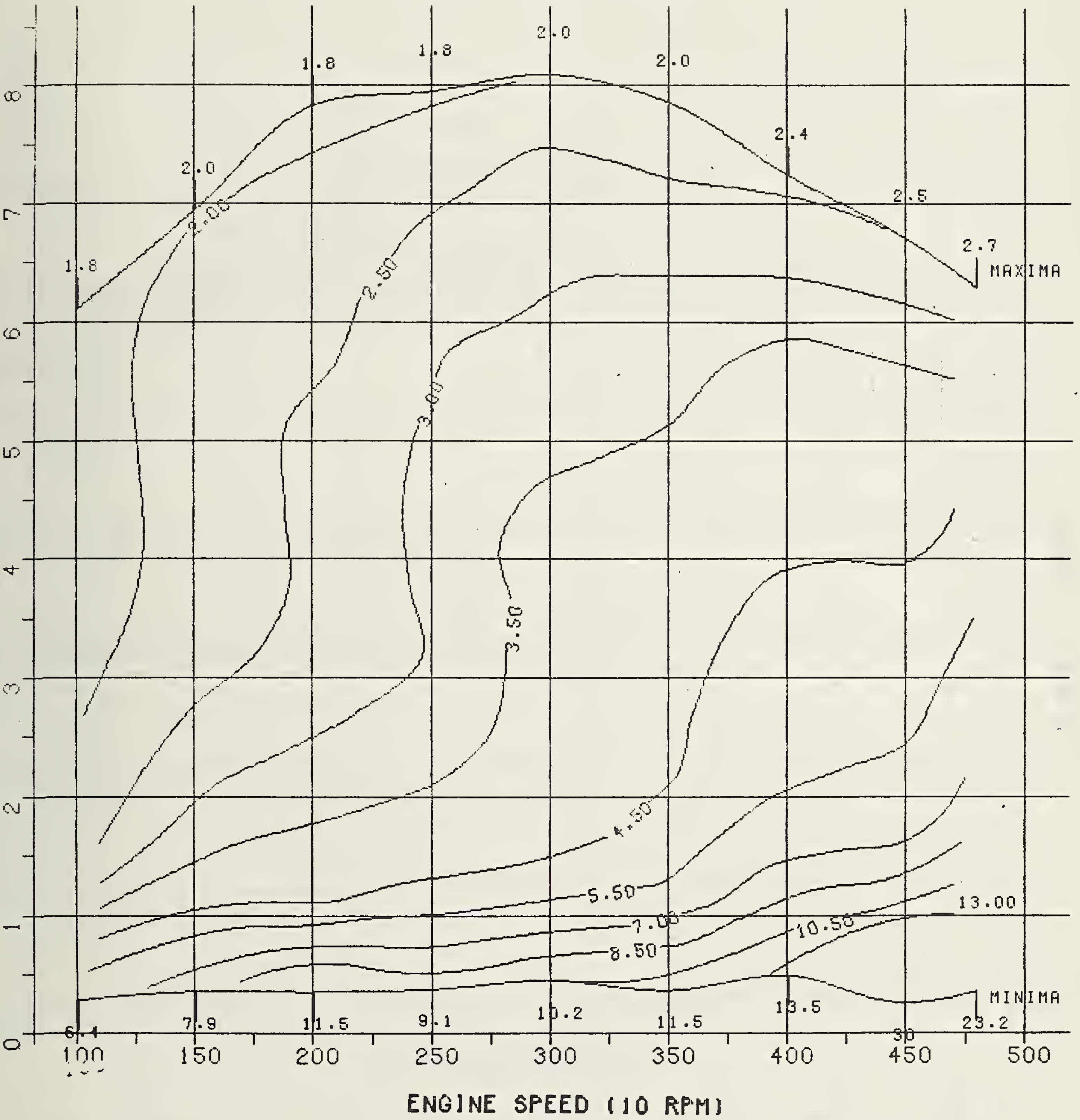
HC CONCENTRATION (PPM)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



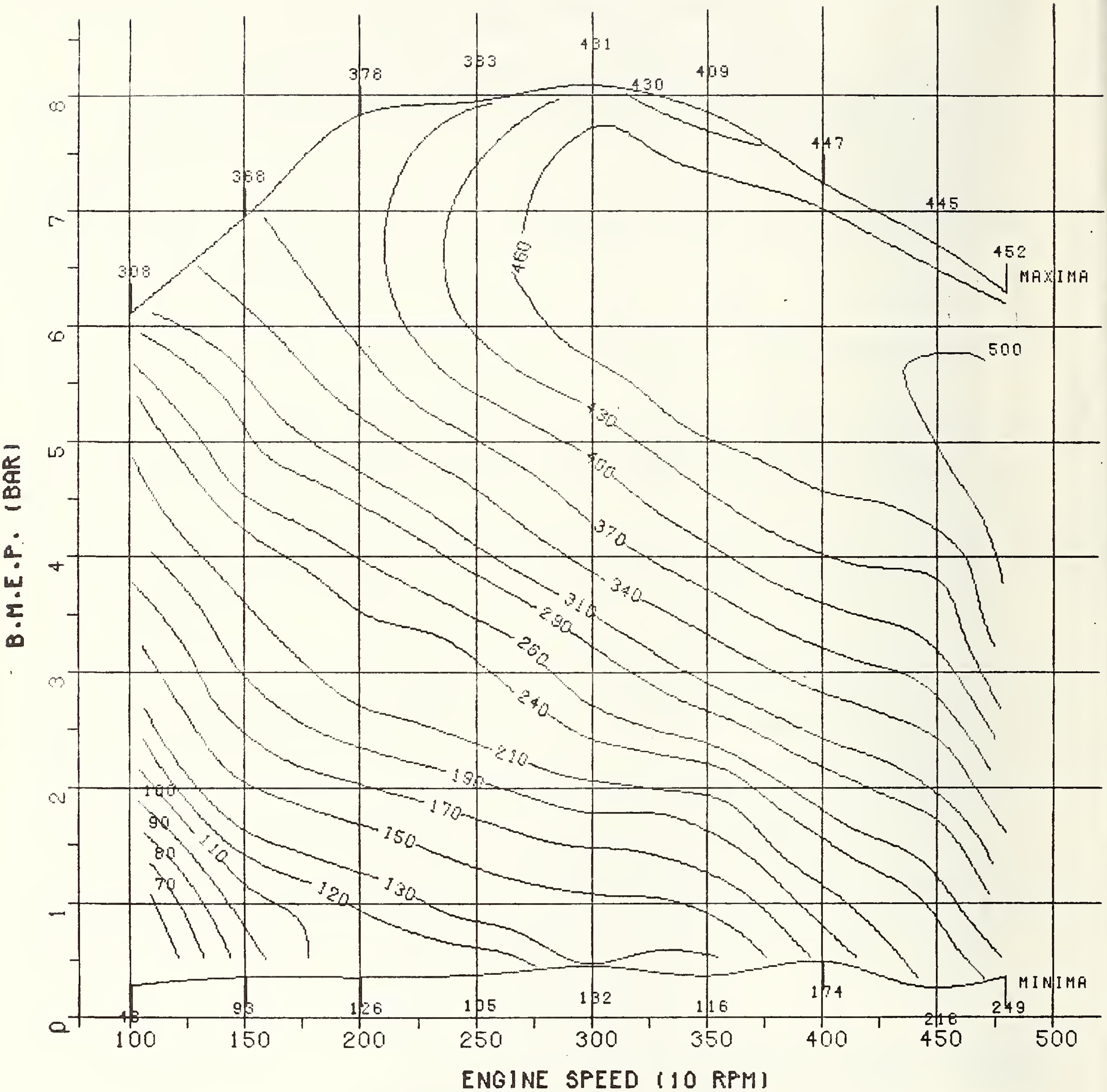
CO EMISSION (G/KWH)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



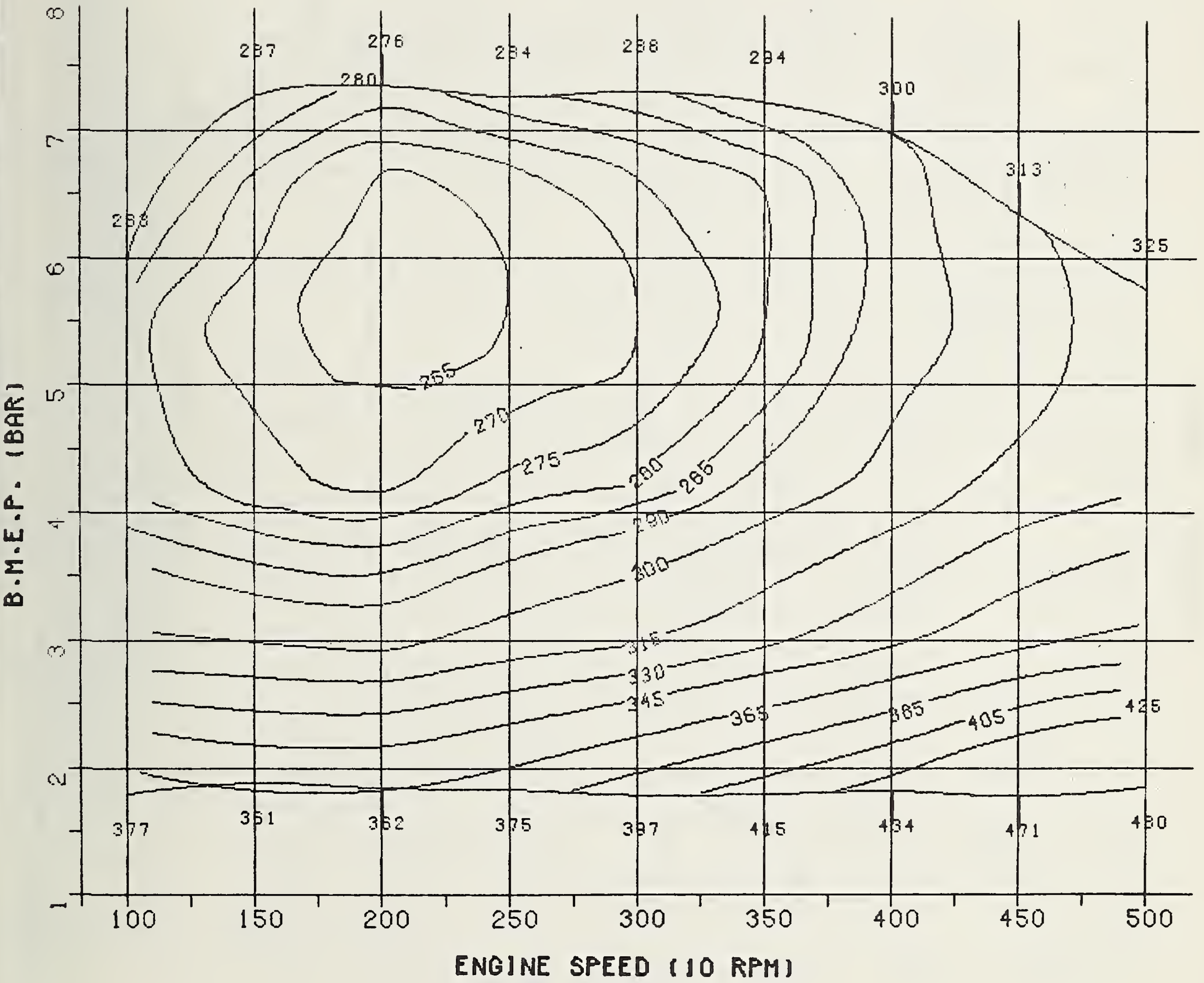
CO CONCENTRATION (%)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



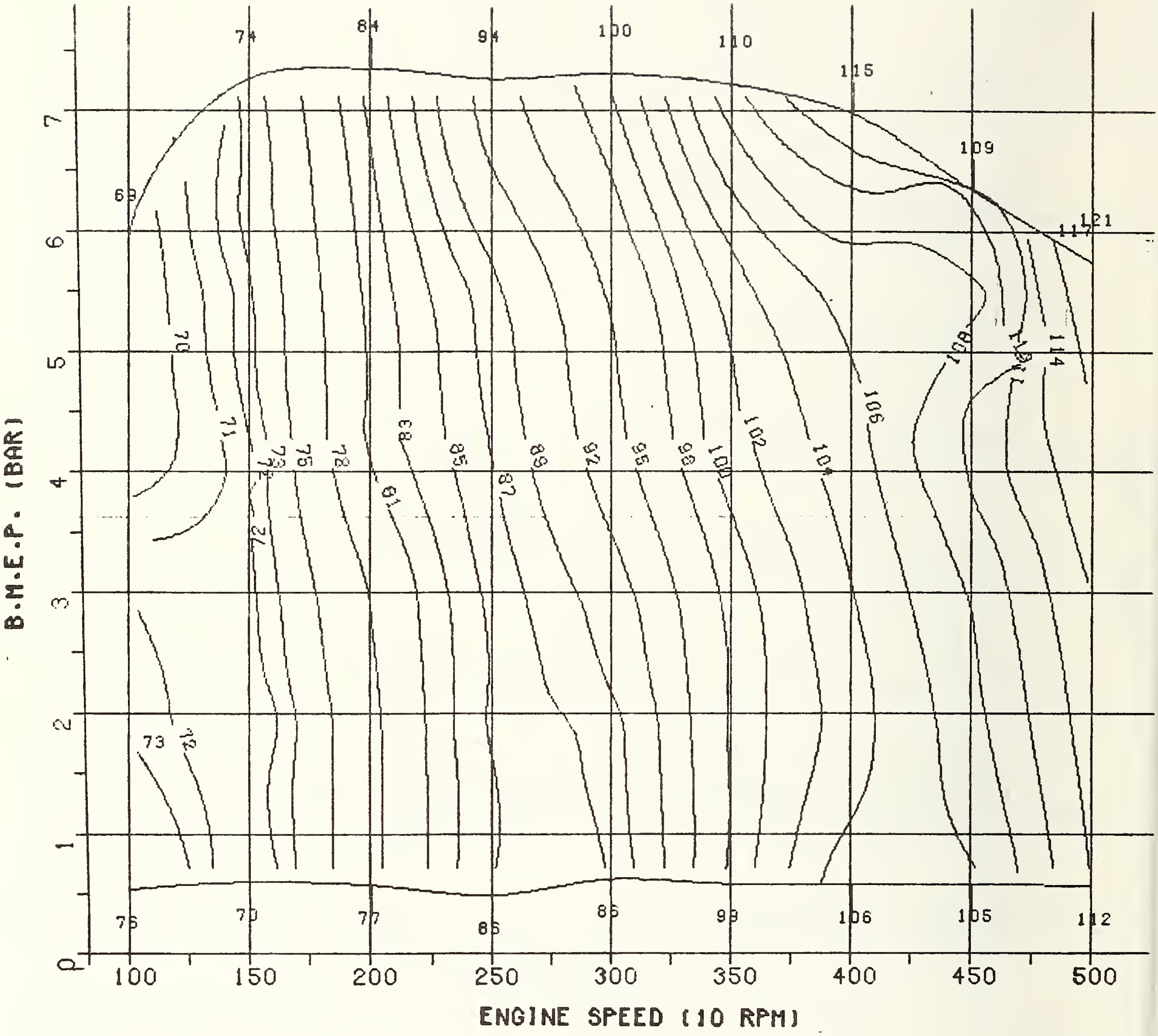
NO EMISSION (G/KWH)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



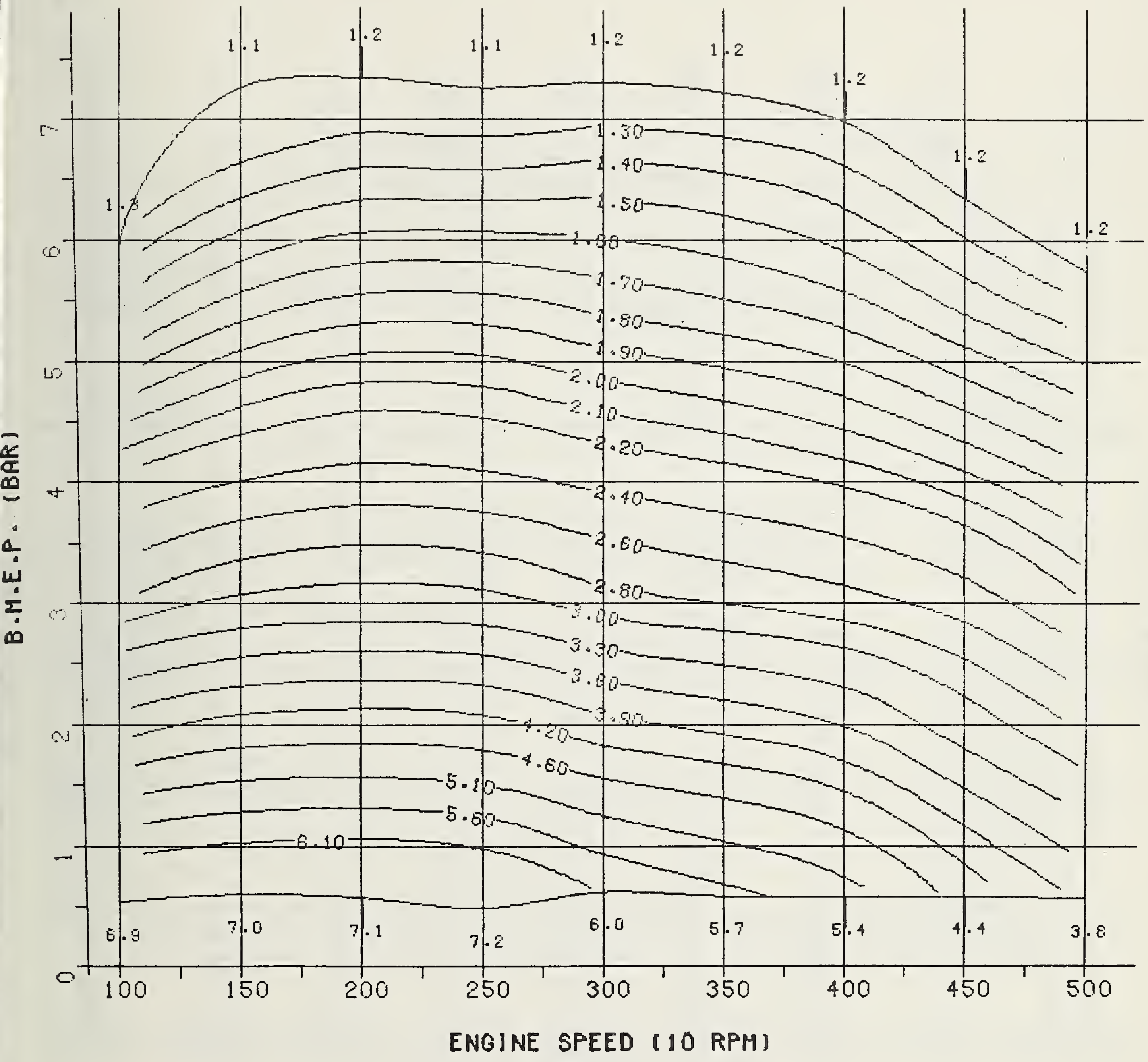
NO CONCENTRATION (PPM)
6 CYLINDER 146 CID N.A. DIESEL ENGINE



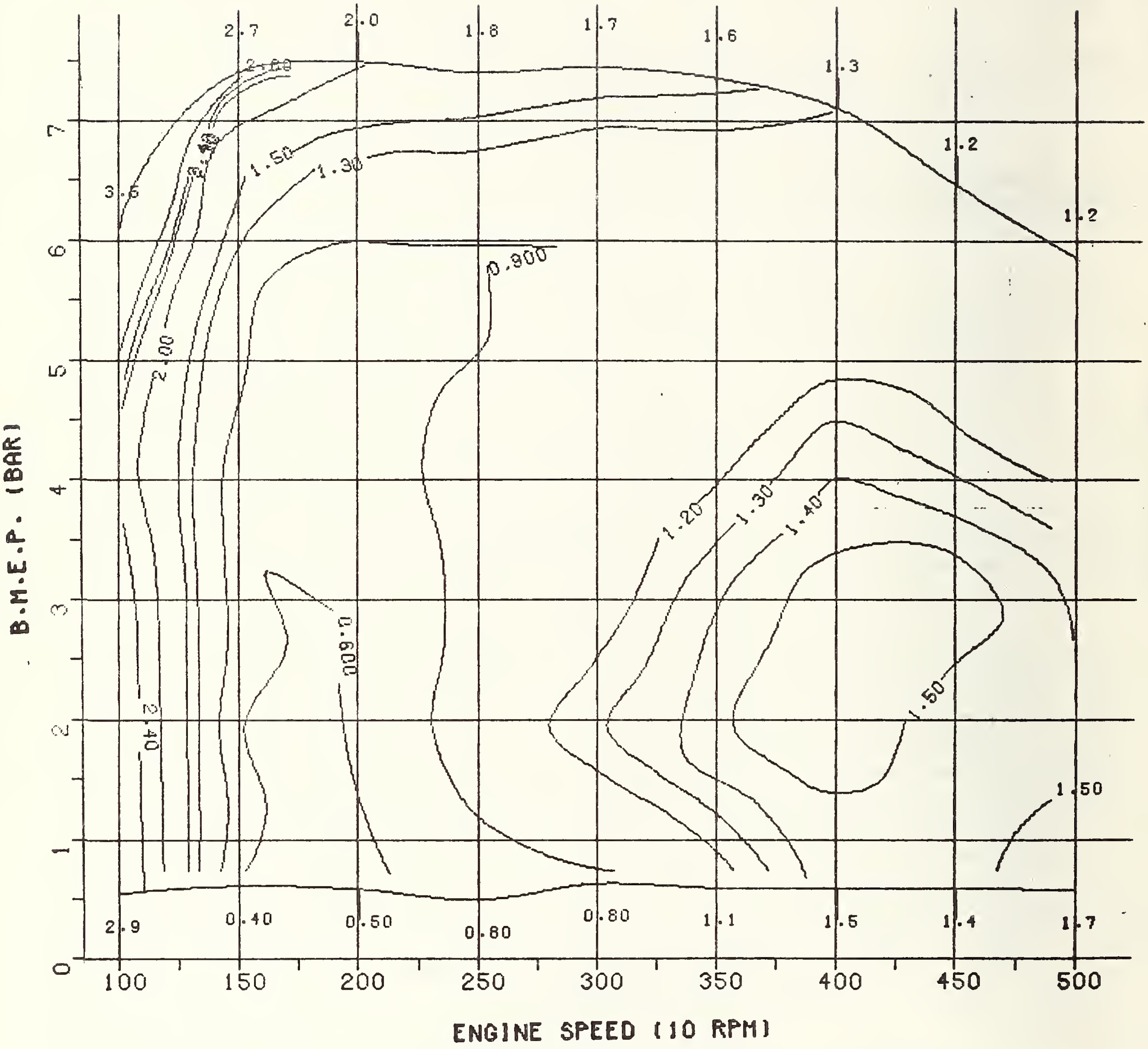
SPECIFIC FUEL CONSUMPTION (G/KWH)
50 HP DIESEL, FUEL 15275



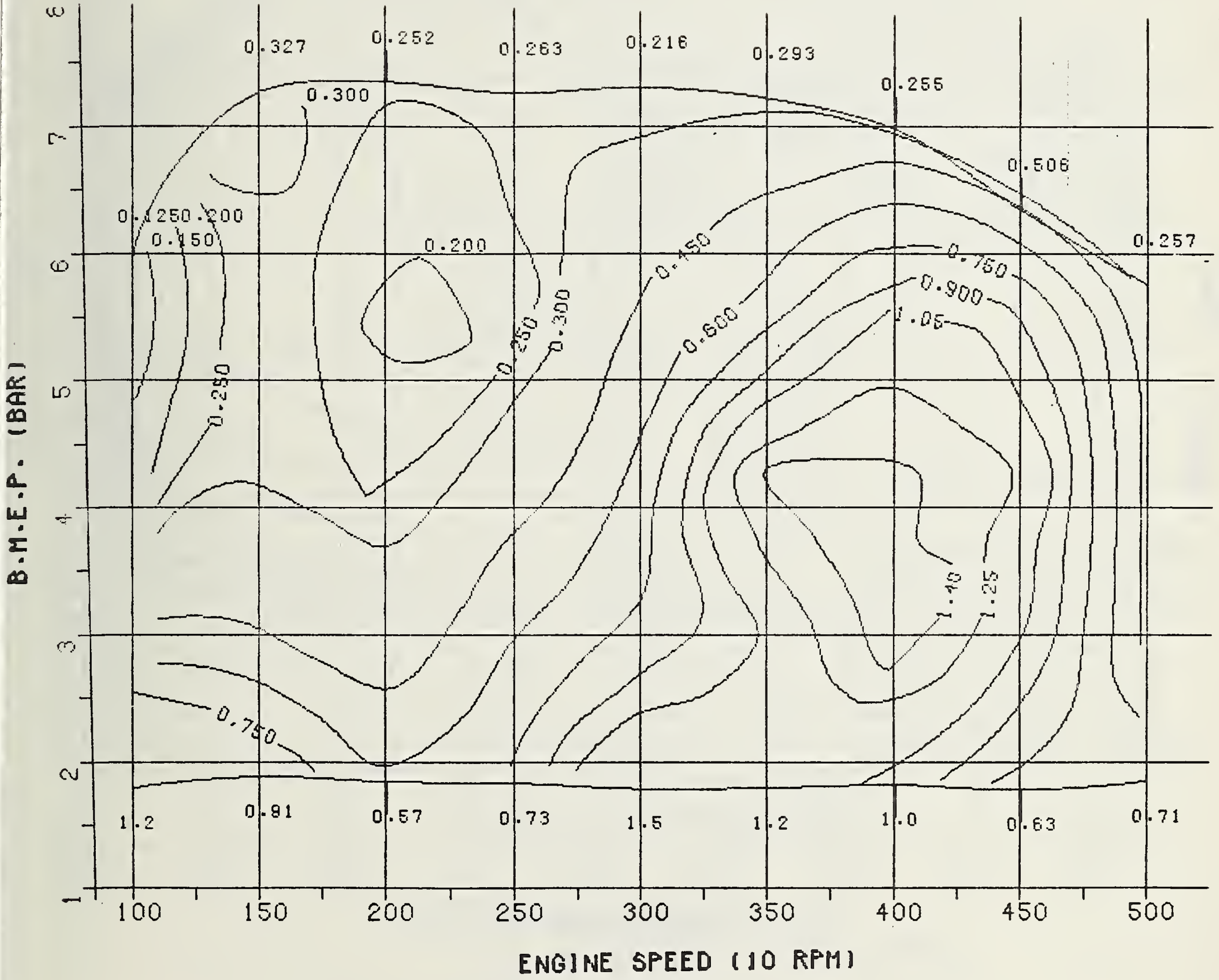
OIL TEMPERATURE (CELSIUS)
50 HP DIESEL, FUEL 15275



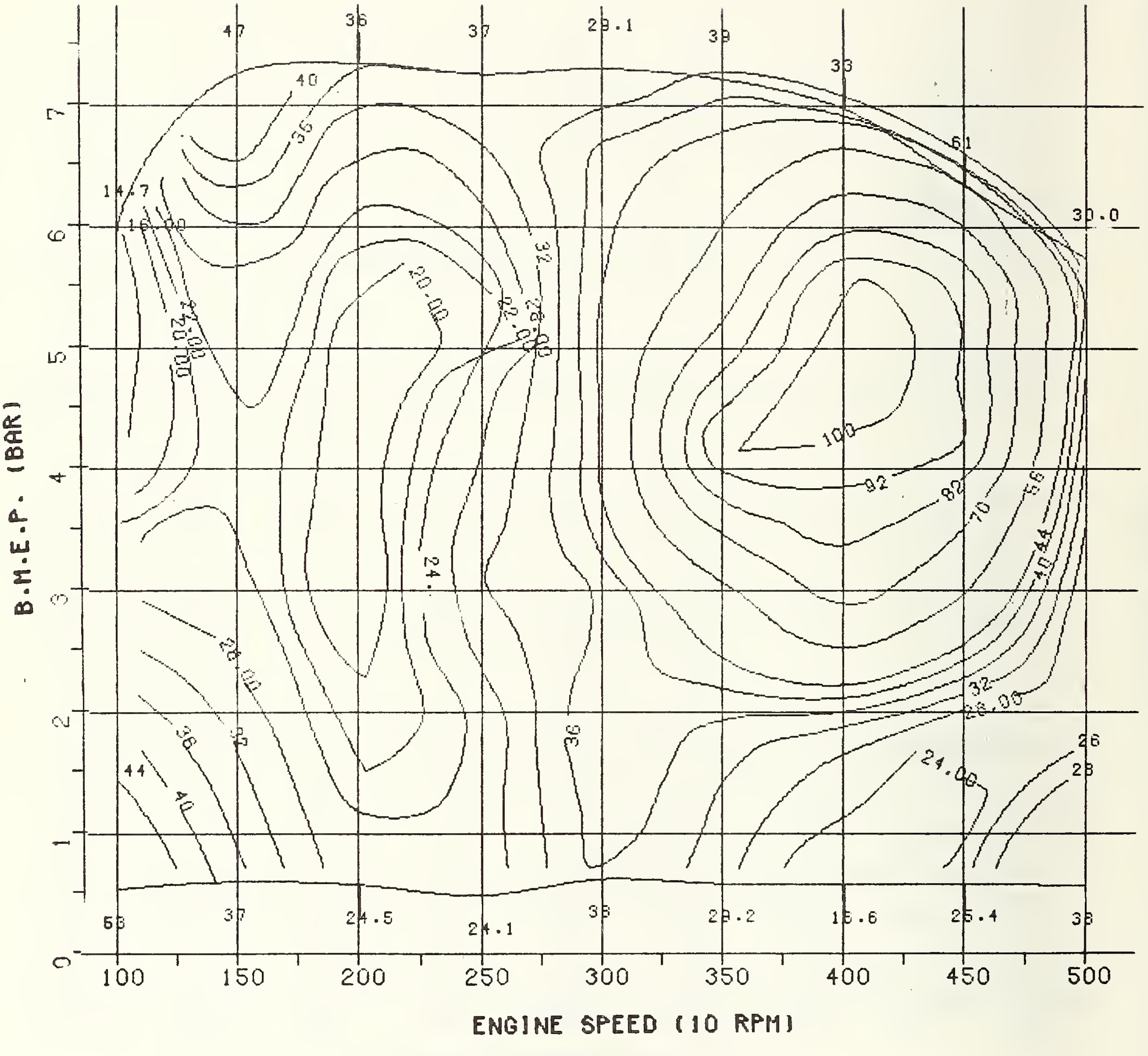
AIR TO FUEL RATIO
50 HP DIESEL, FUEL 15275



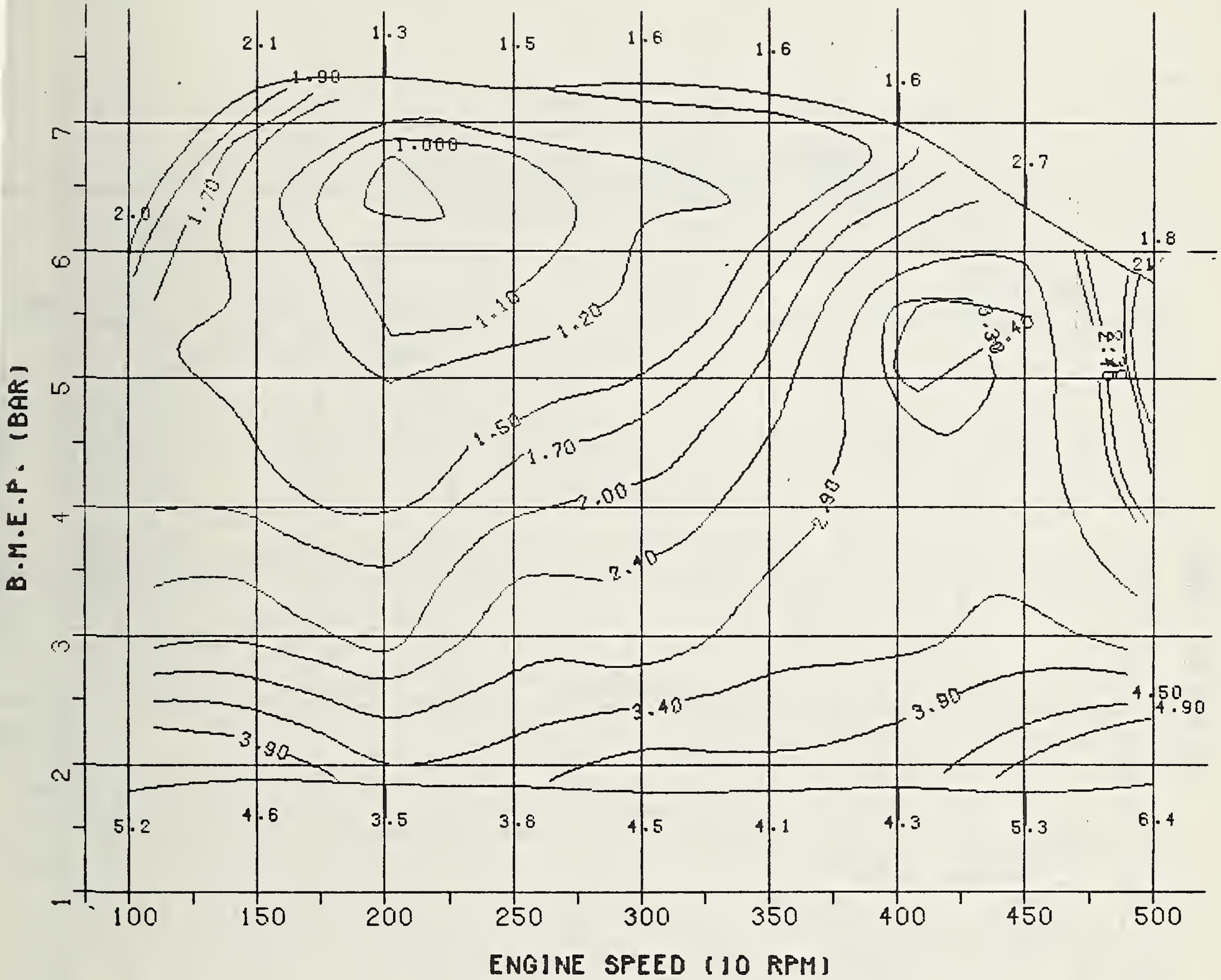
SMOKE (BOSCH NUMBER)
50 HP DIESEL, FUEL 15275



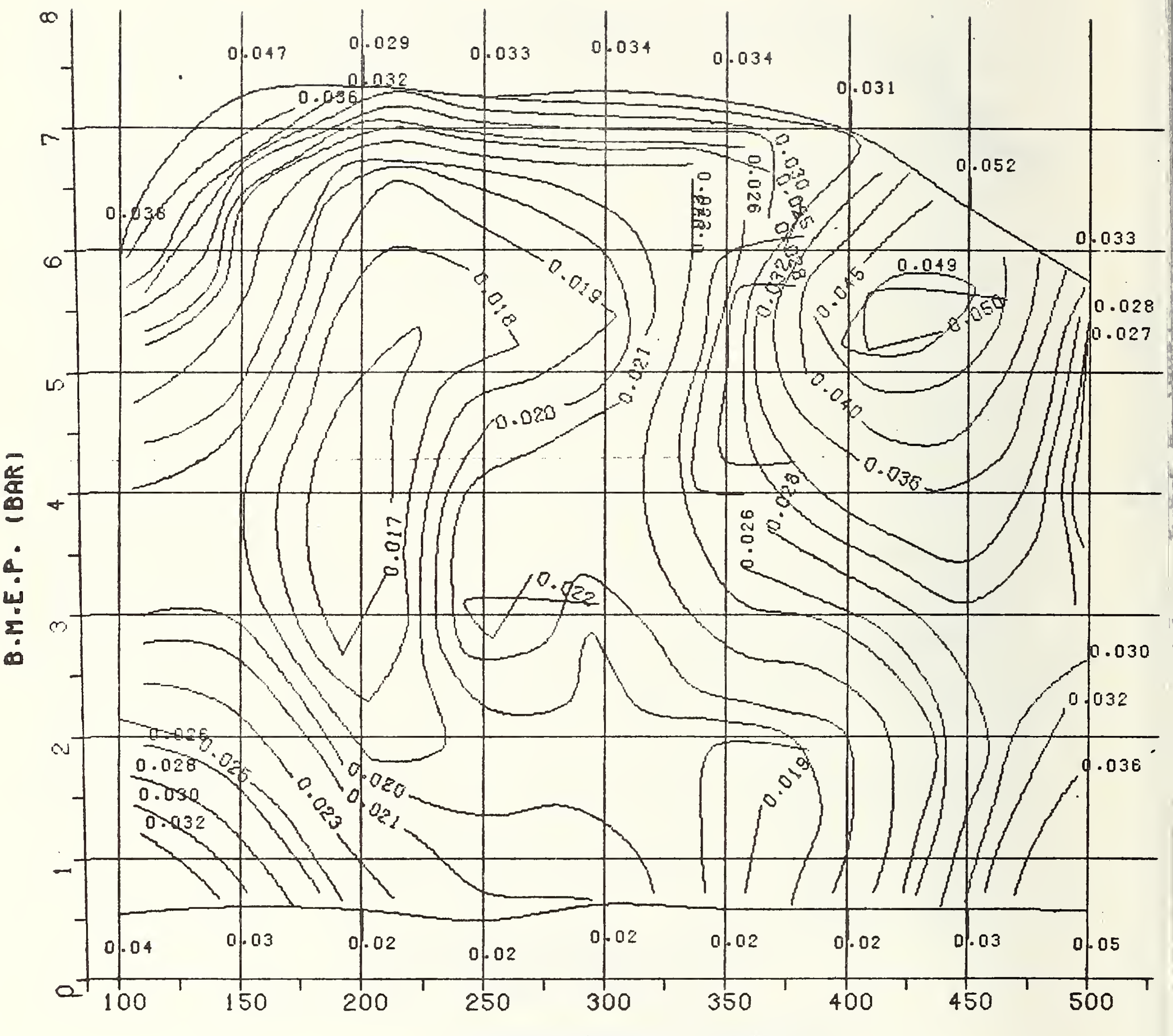
HC EMISSION (G/KWH)
50 HP DIESEL, FUEL 15275



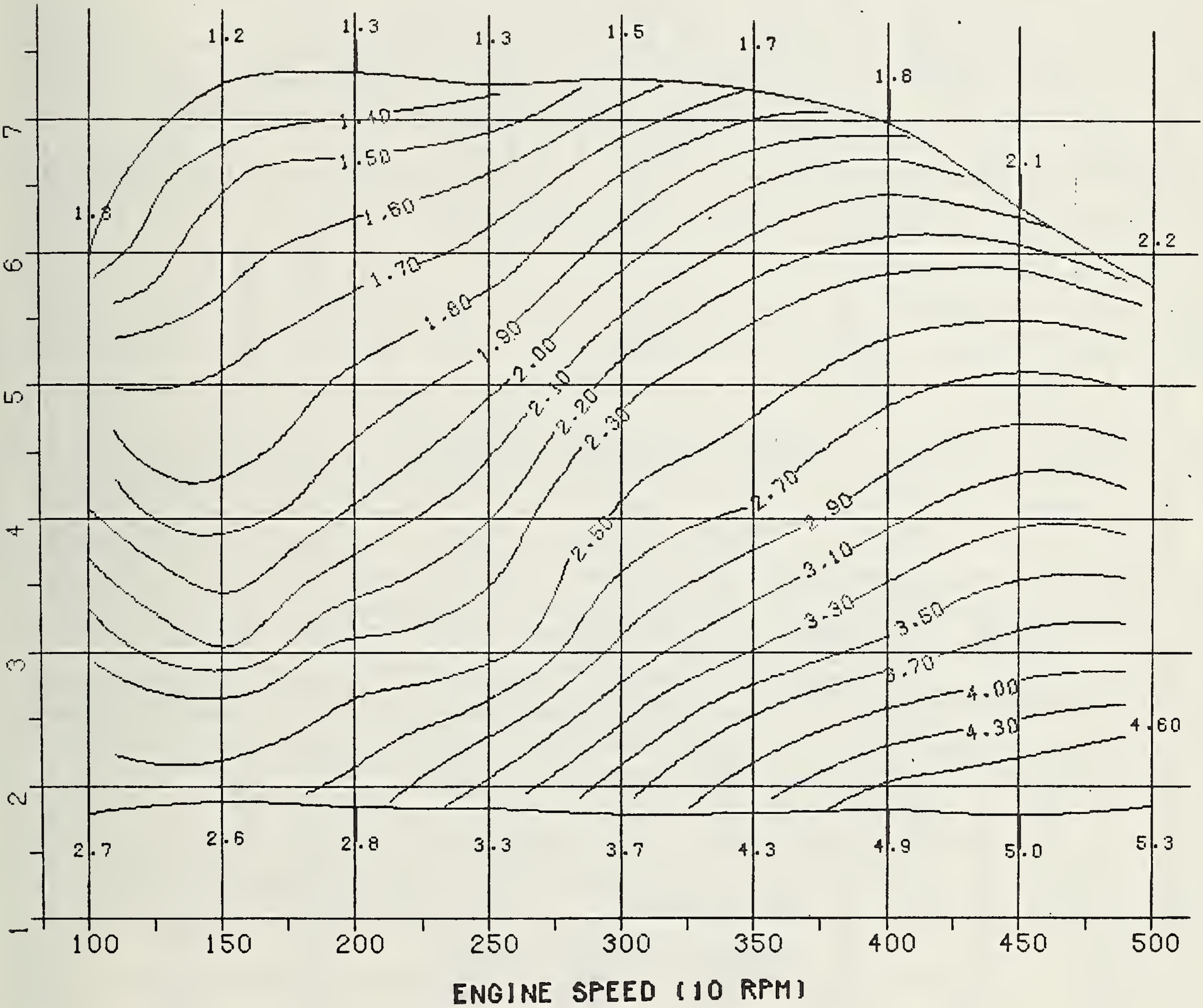
HC CONCENTRATION (PPM)
50 HP DIESEL, FUEL 15275



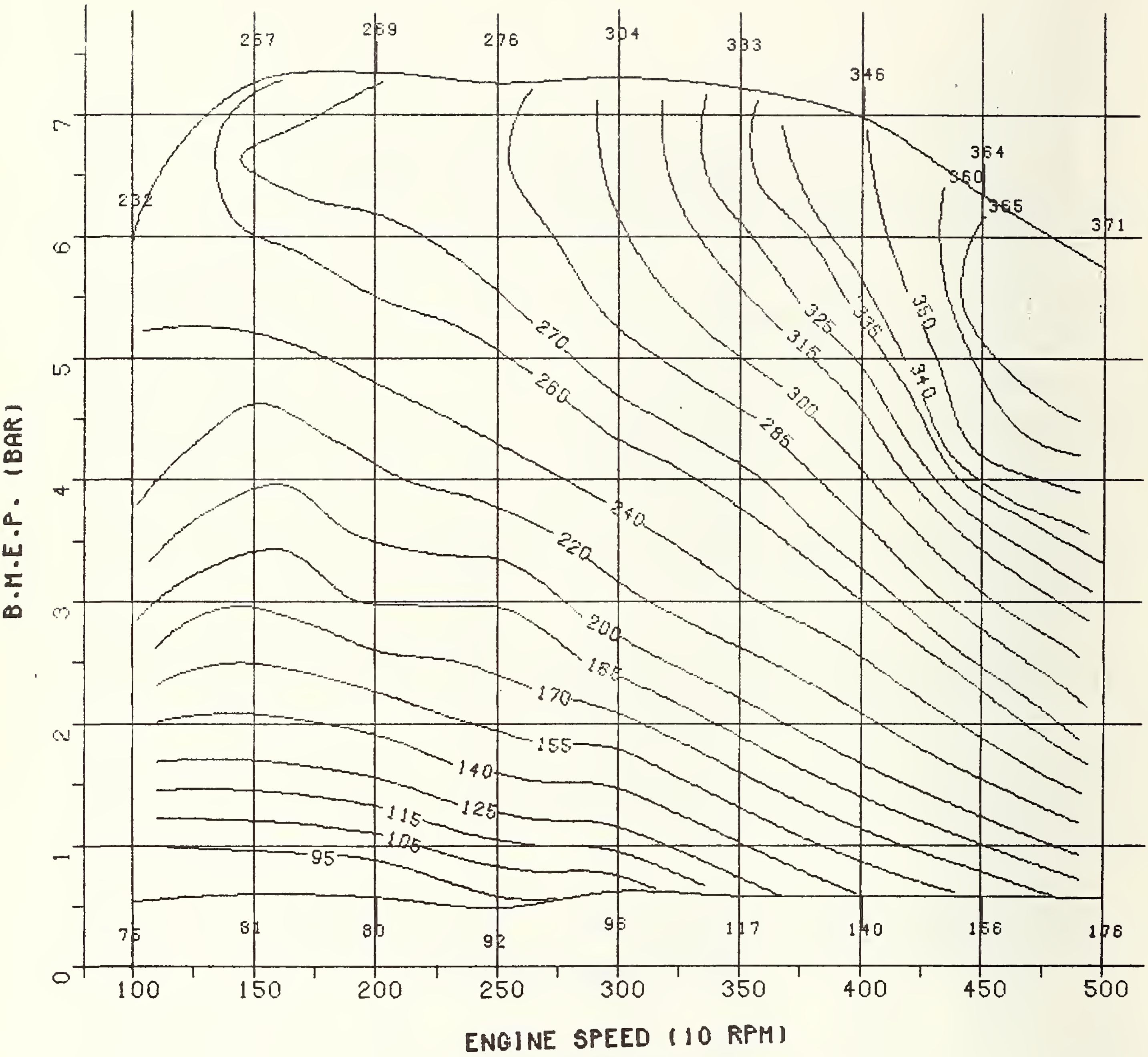
CO EMISSION (G/KWH)
50 HP DIESEL, FUEL 15275



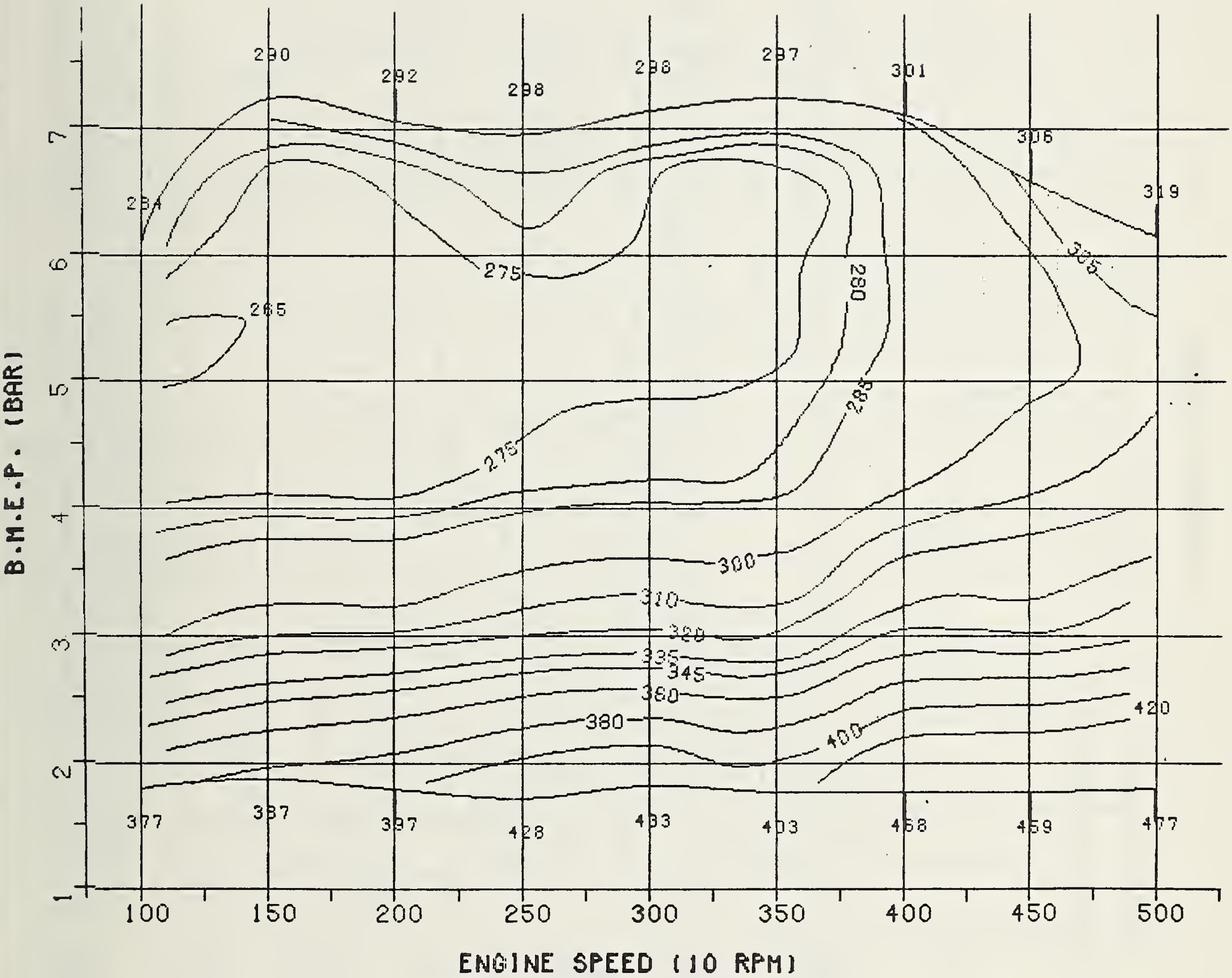
CO CONCENTRATION (%)
50 HP DIESEL, FUEL 15275



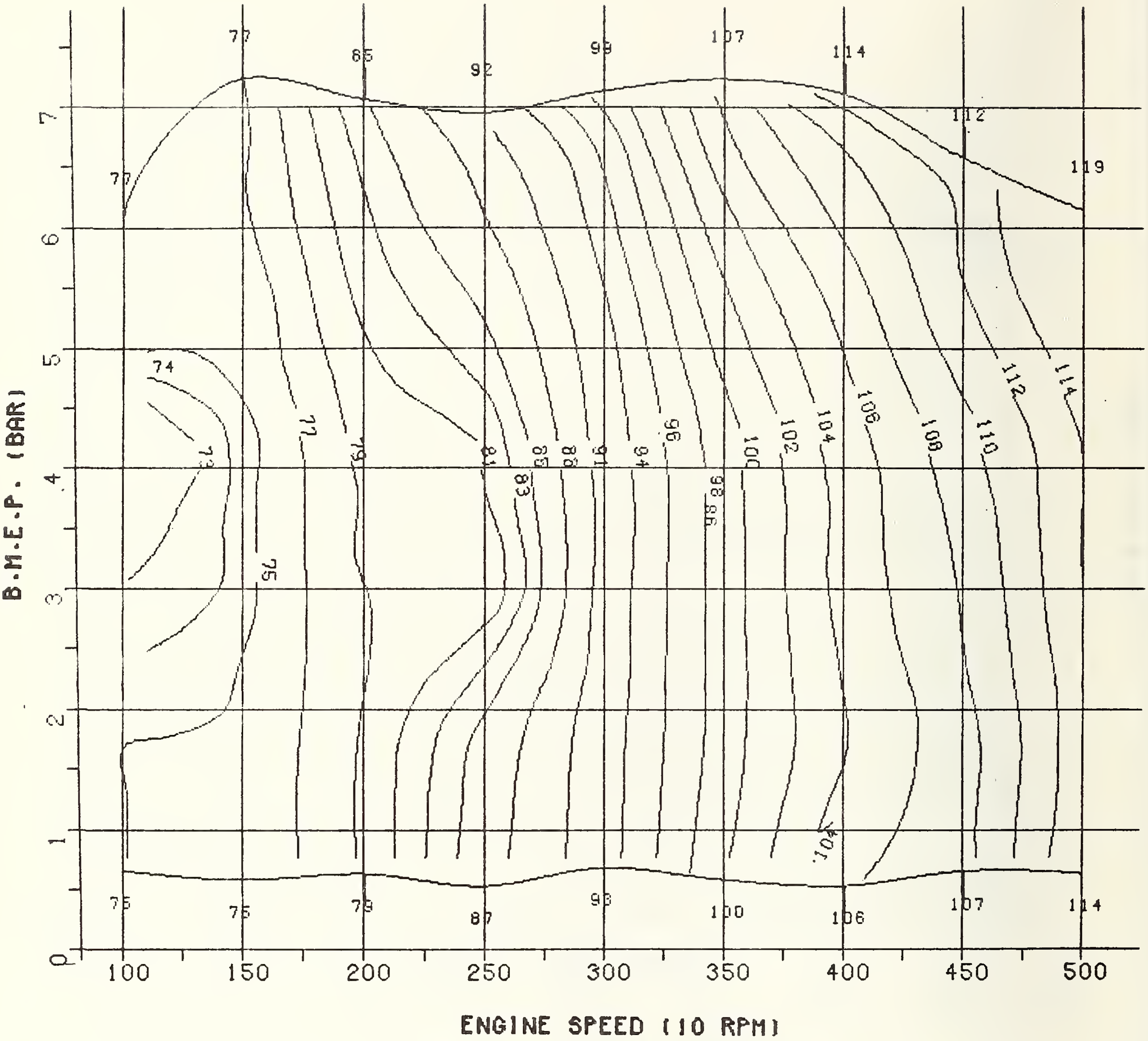
NO EMISSION (G/KWH)
50 HP DIESEL, FUEL 15275



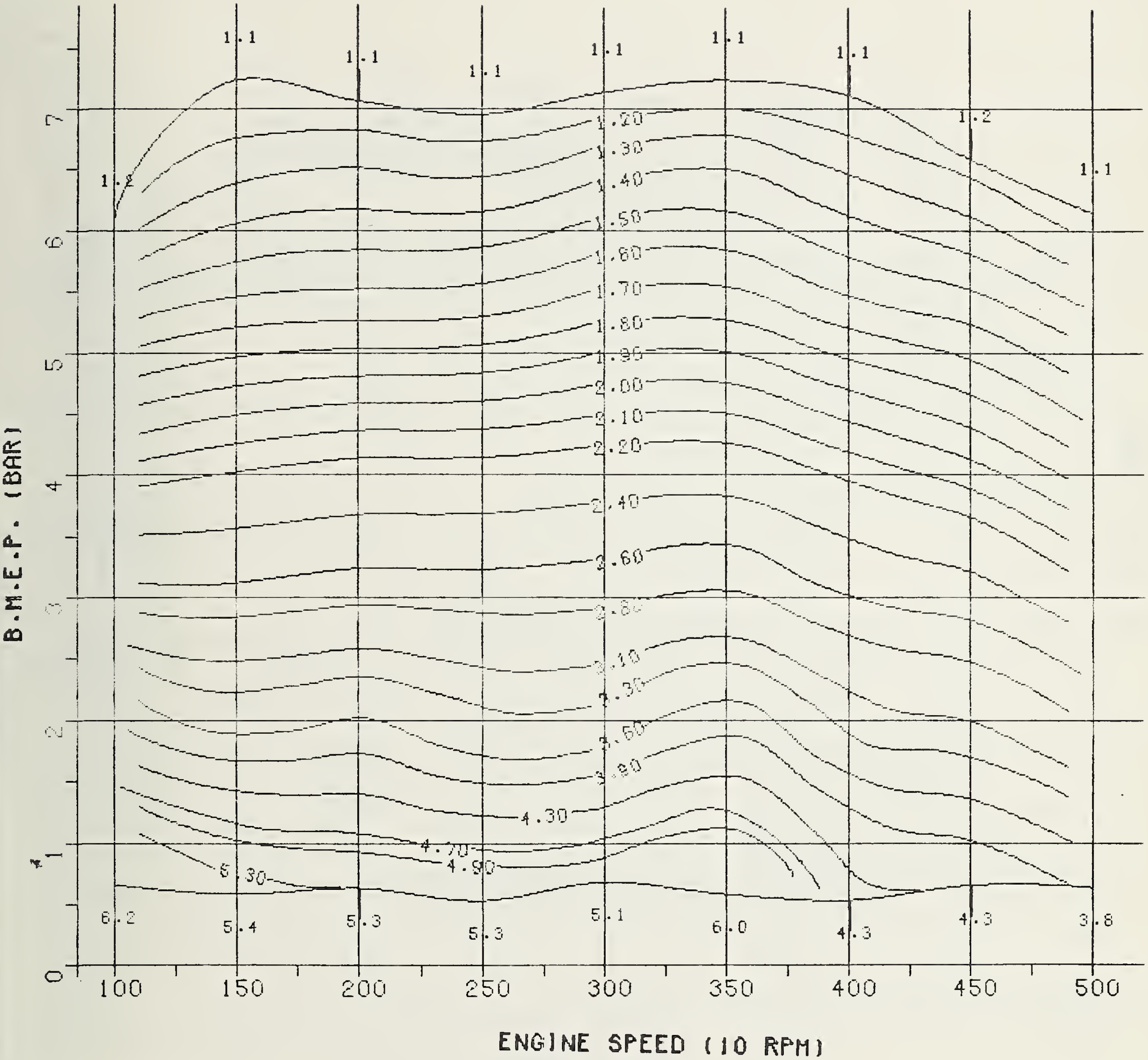
NO CONCENTRATION (PPM)
50 HP DIESEL, FUEL 15275



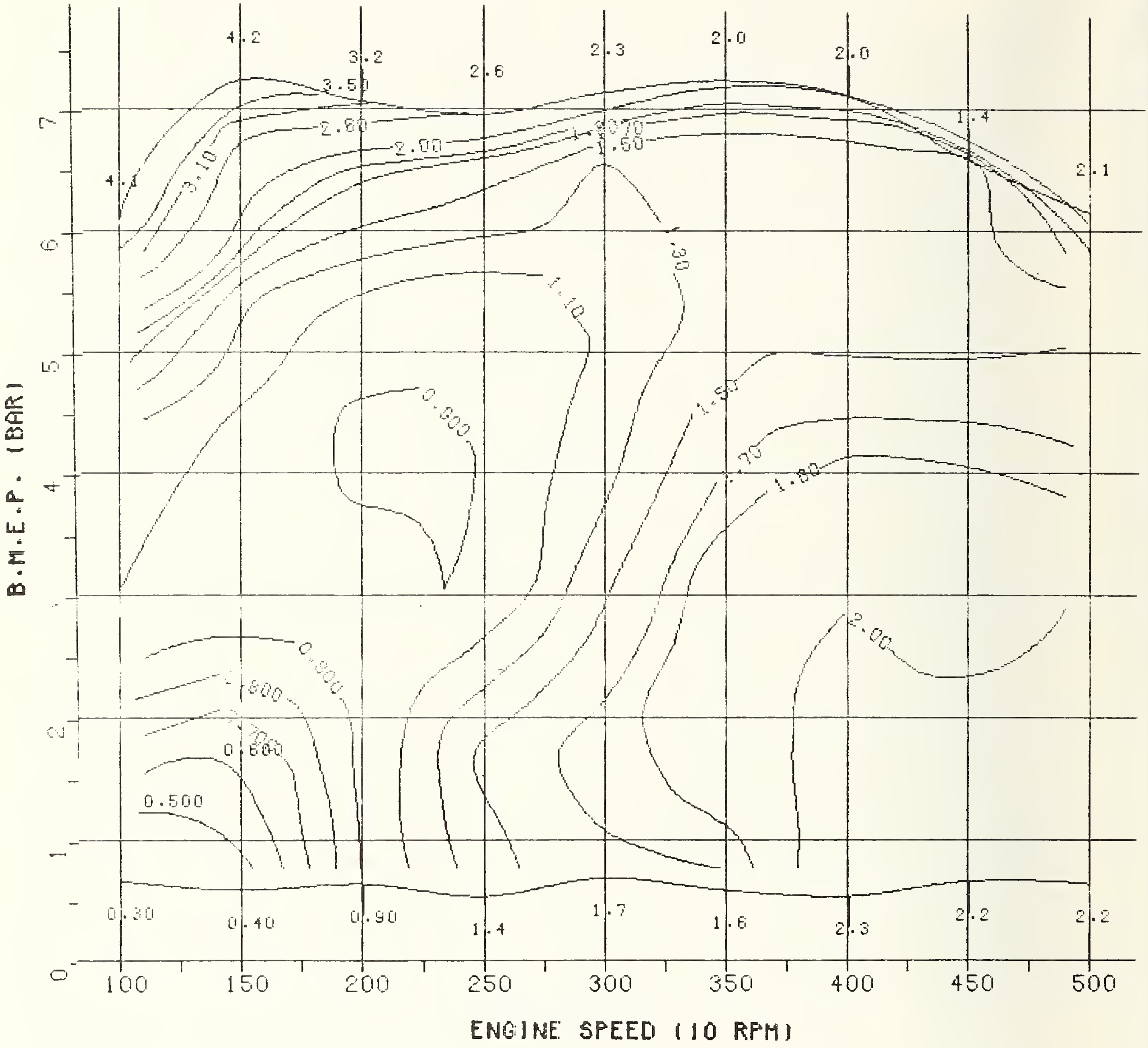
SPECIFIC FUEL CONSUMPTION (G/KWH)
50 HP DIESEL, FUEL 16086



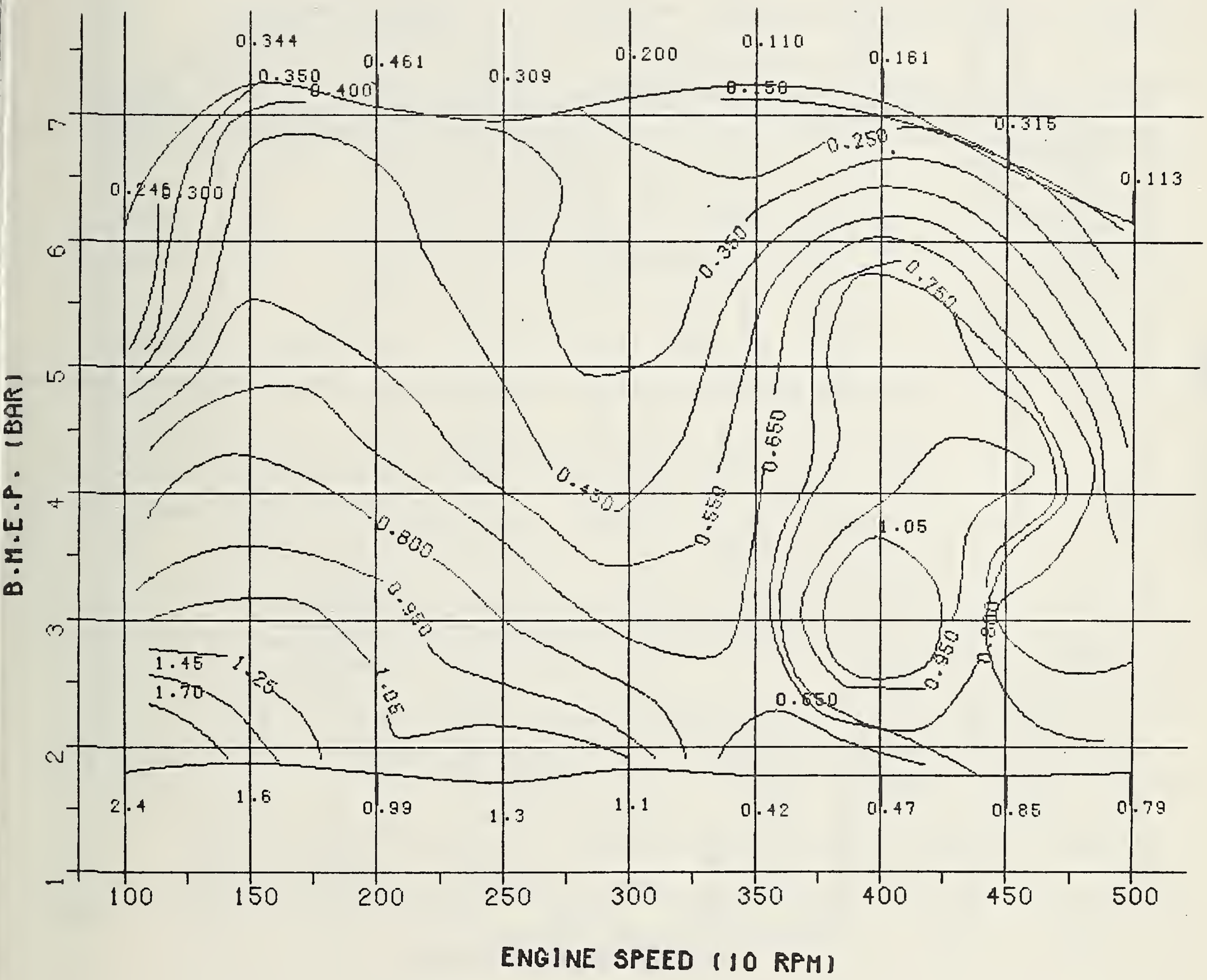
OIL TEMPERATURE (CELSIUS)
50 HP DIESEL, FUEL 16086



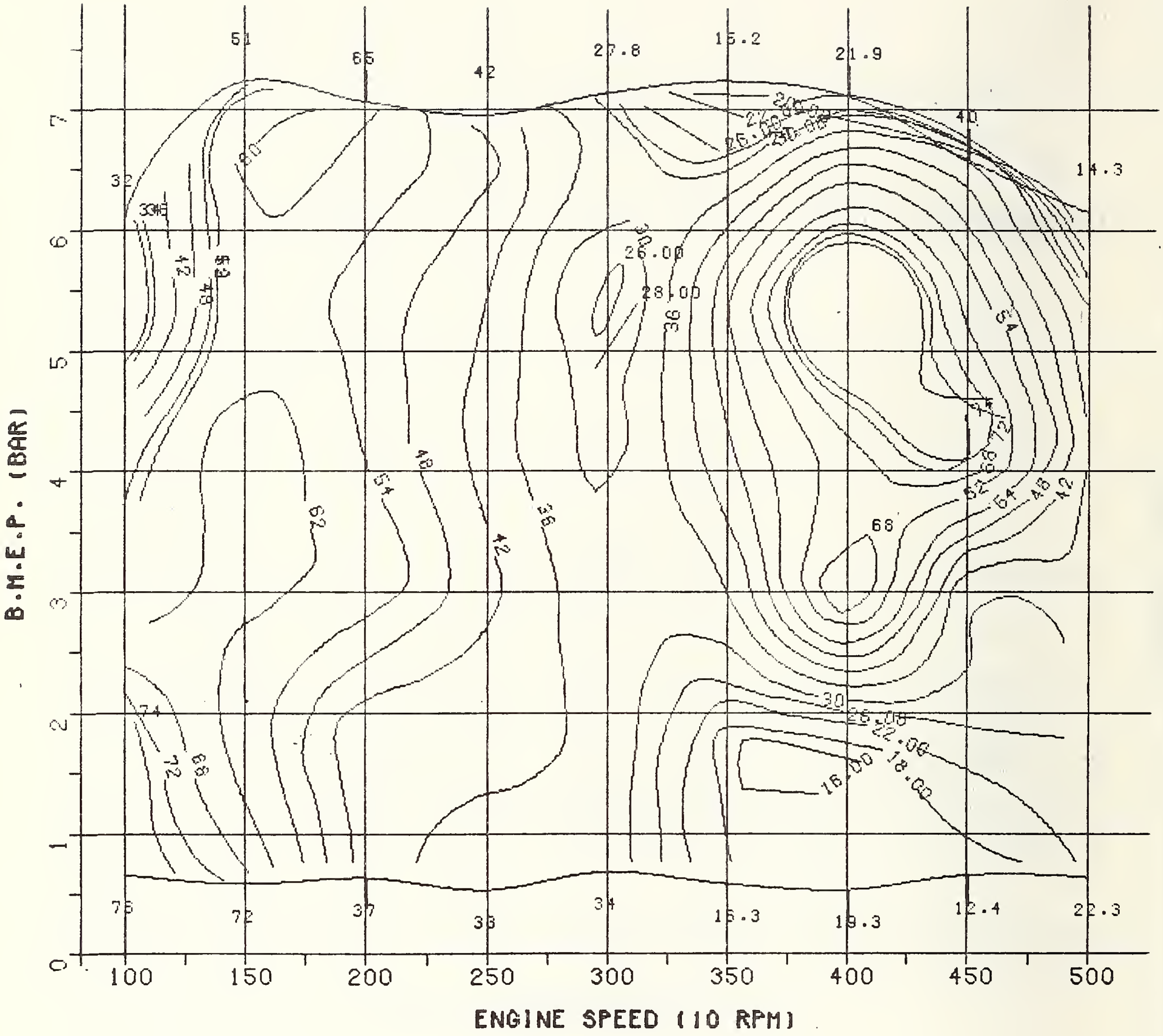
AIR TO FUEL RATIO
50 HP DIESEL, FUEL 16086



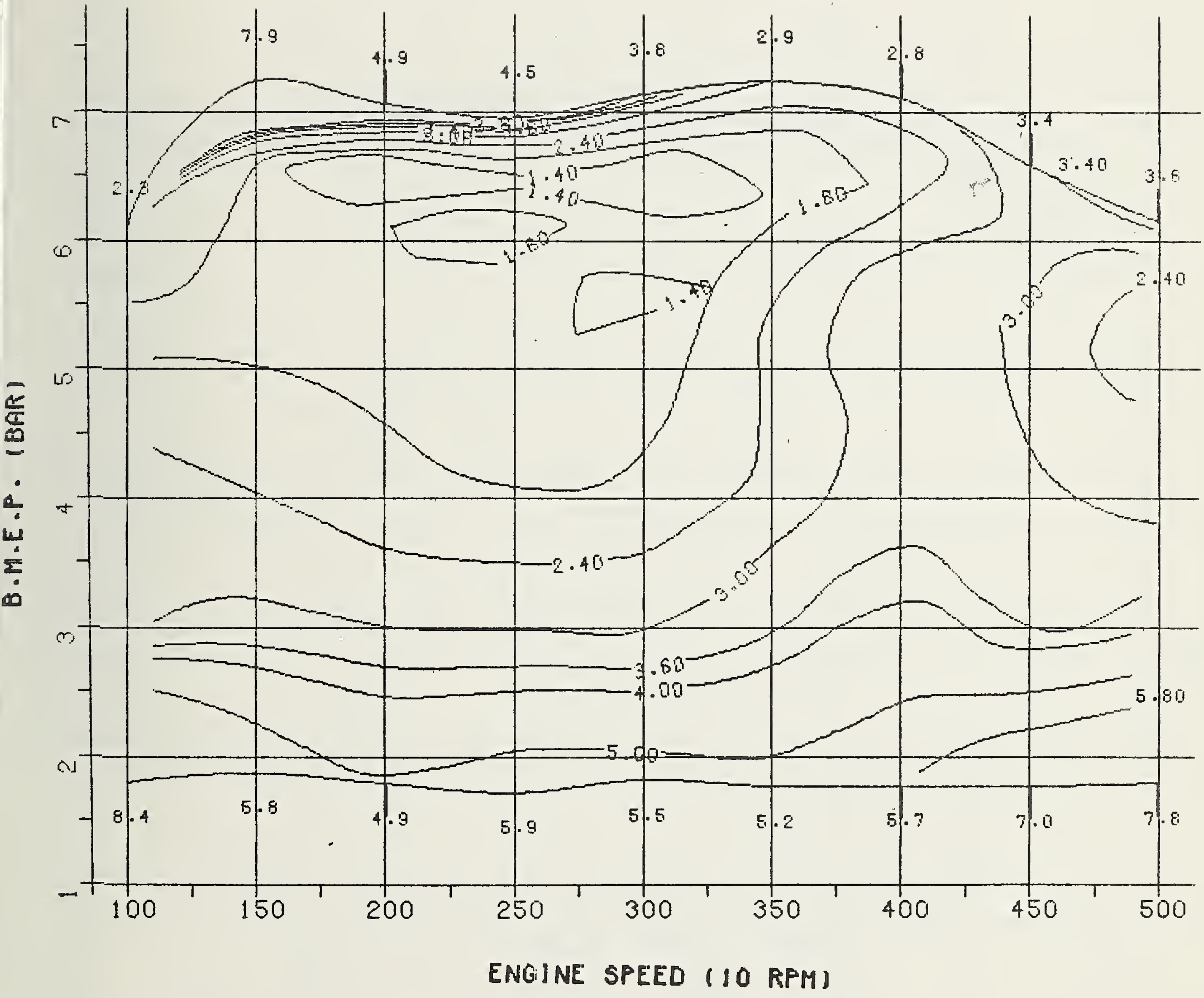
SMOKE (BOSCH NUMBER)
50 HP DIESEL, FUEL 16086



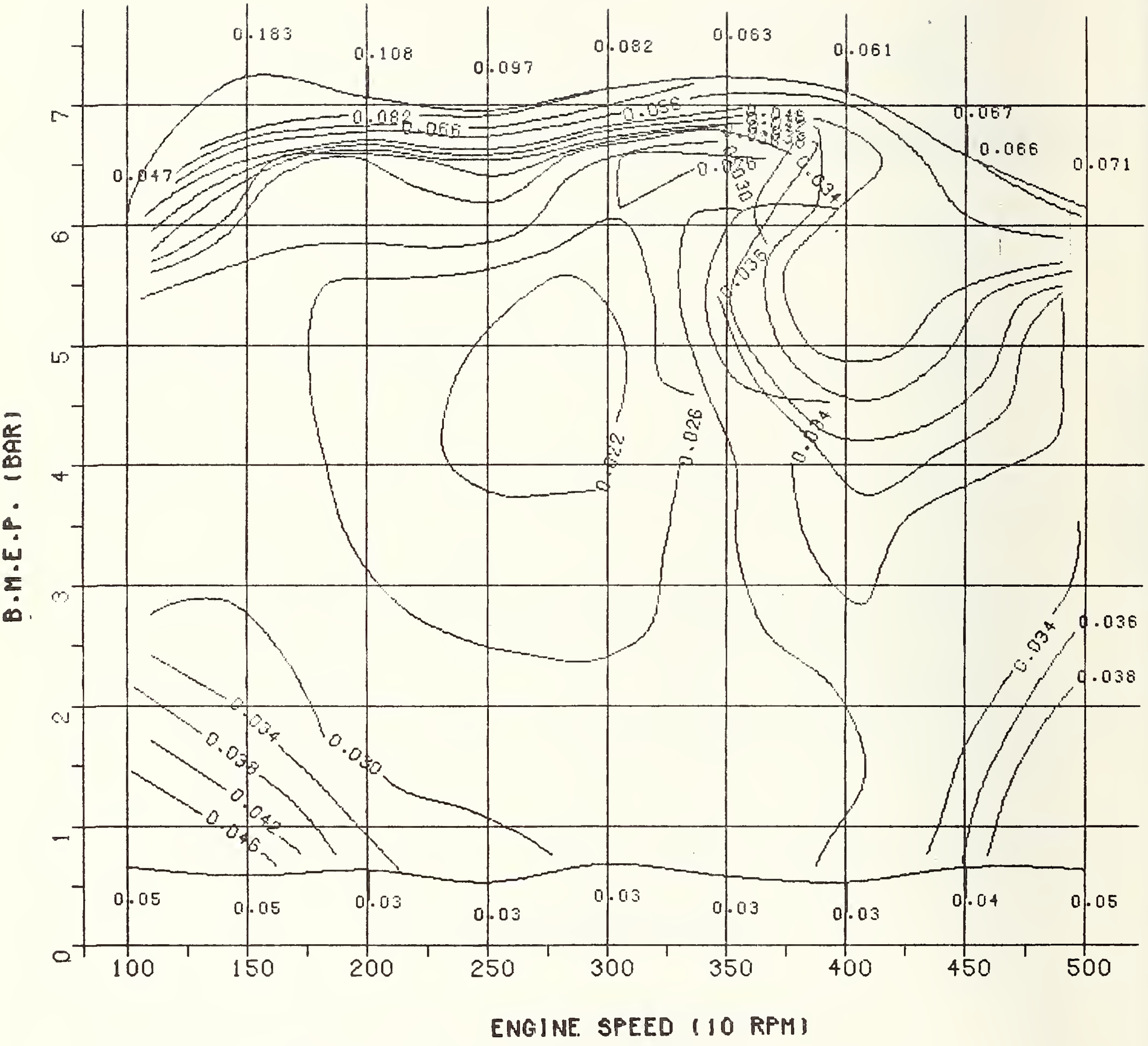
HC EMISSION (G/KWH)
50 HP DIESEL, FUEL 16086



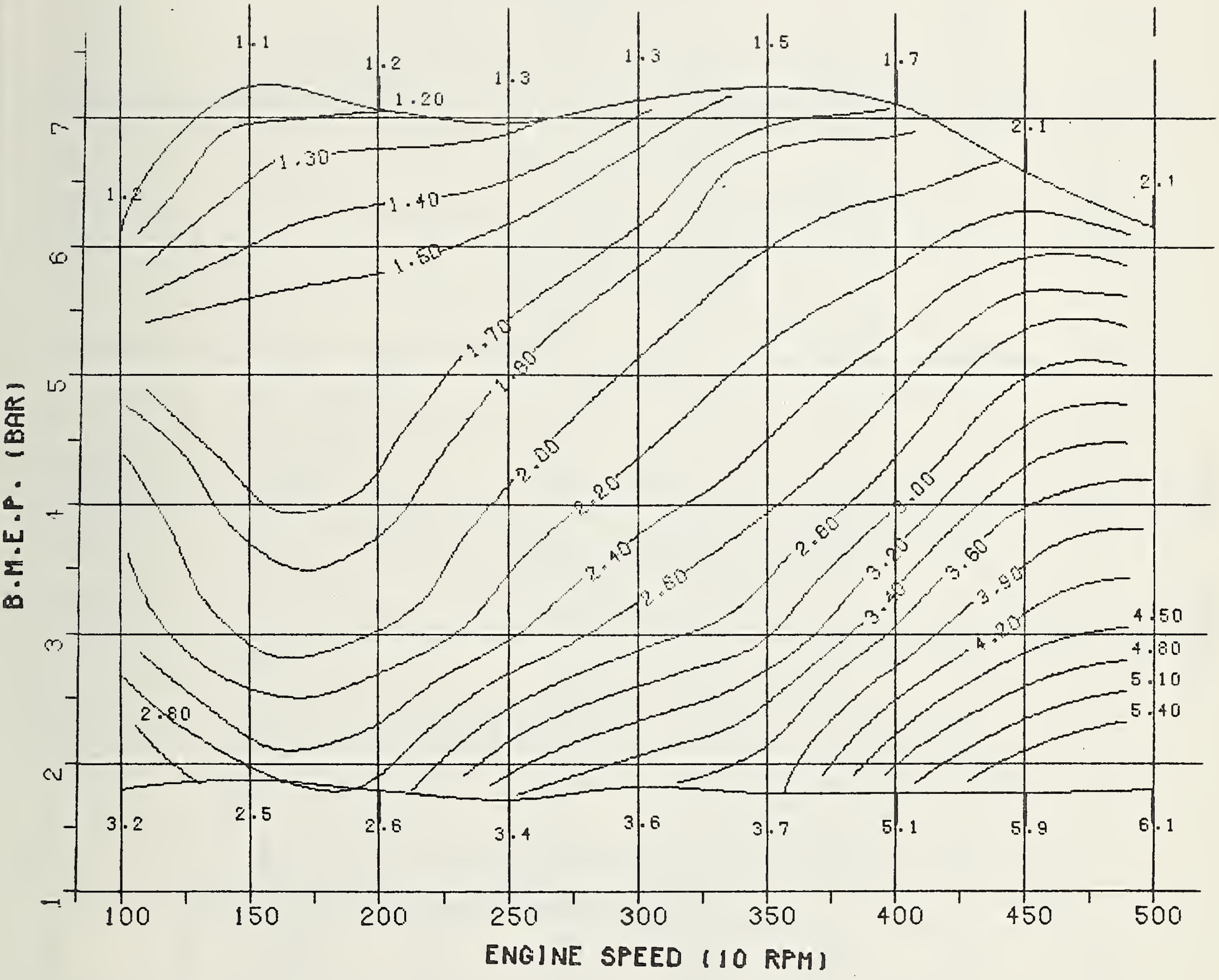
HC CONCENTRATION (PPM)
50 HP DIESEL, FUEL 16086



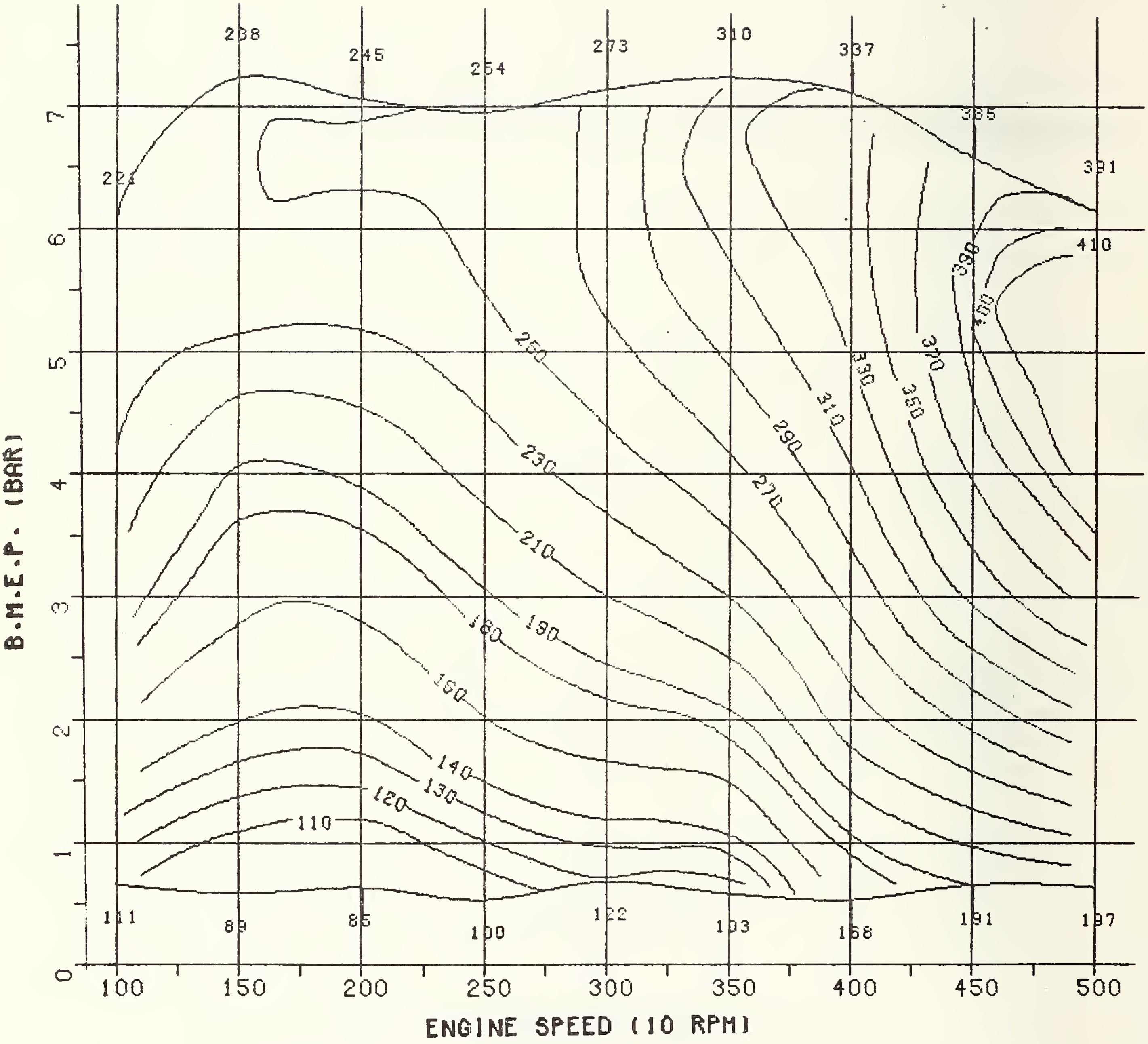
CO EMISSION (G/KWH)
50 HP DIESEL, FUEL 16086



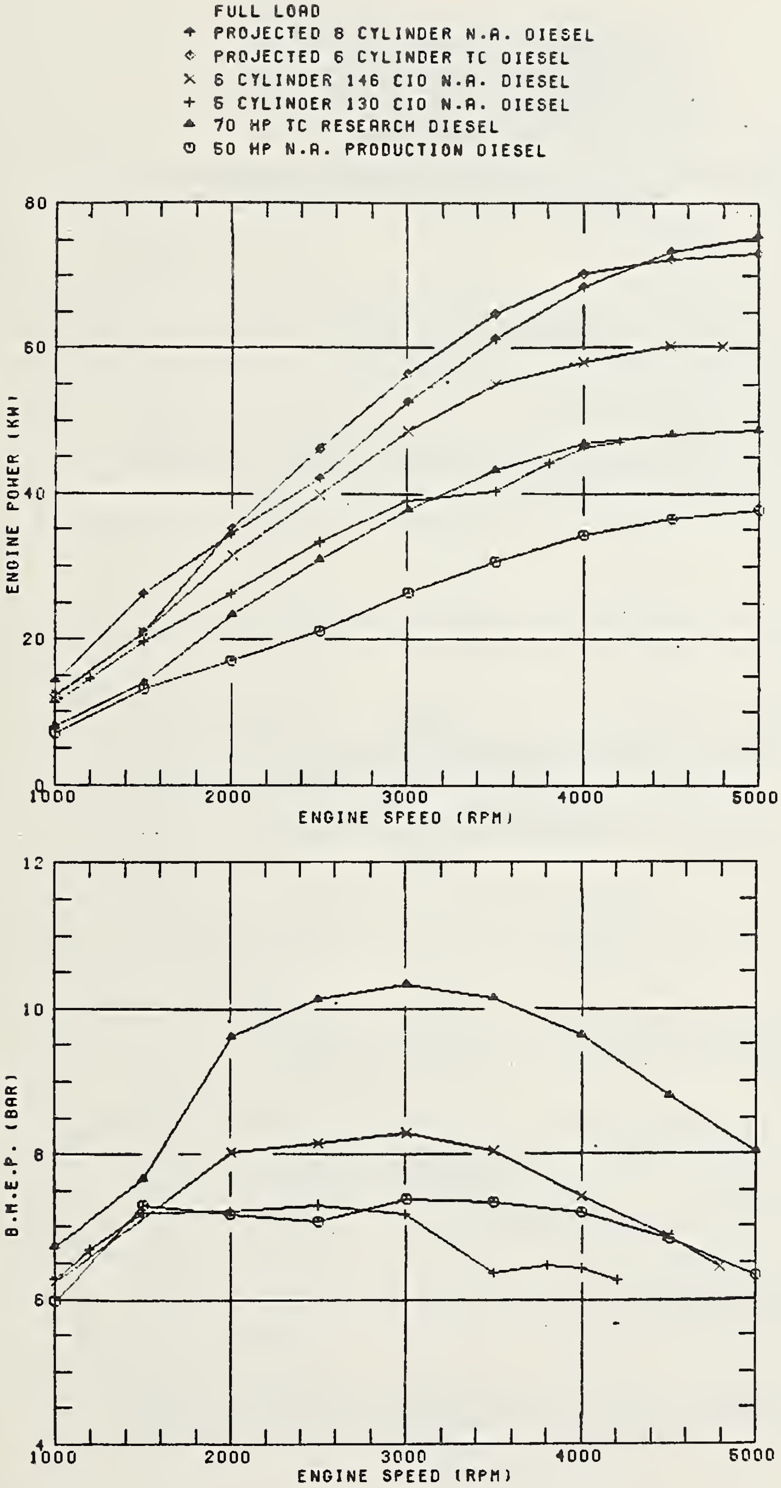
CO CONCENTRATION (%)
50 HP DIESEL, FUEL 16086

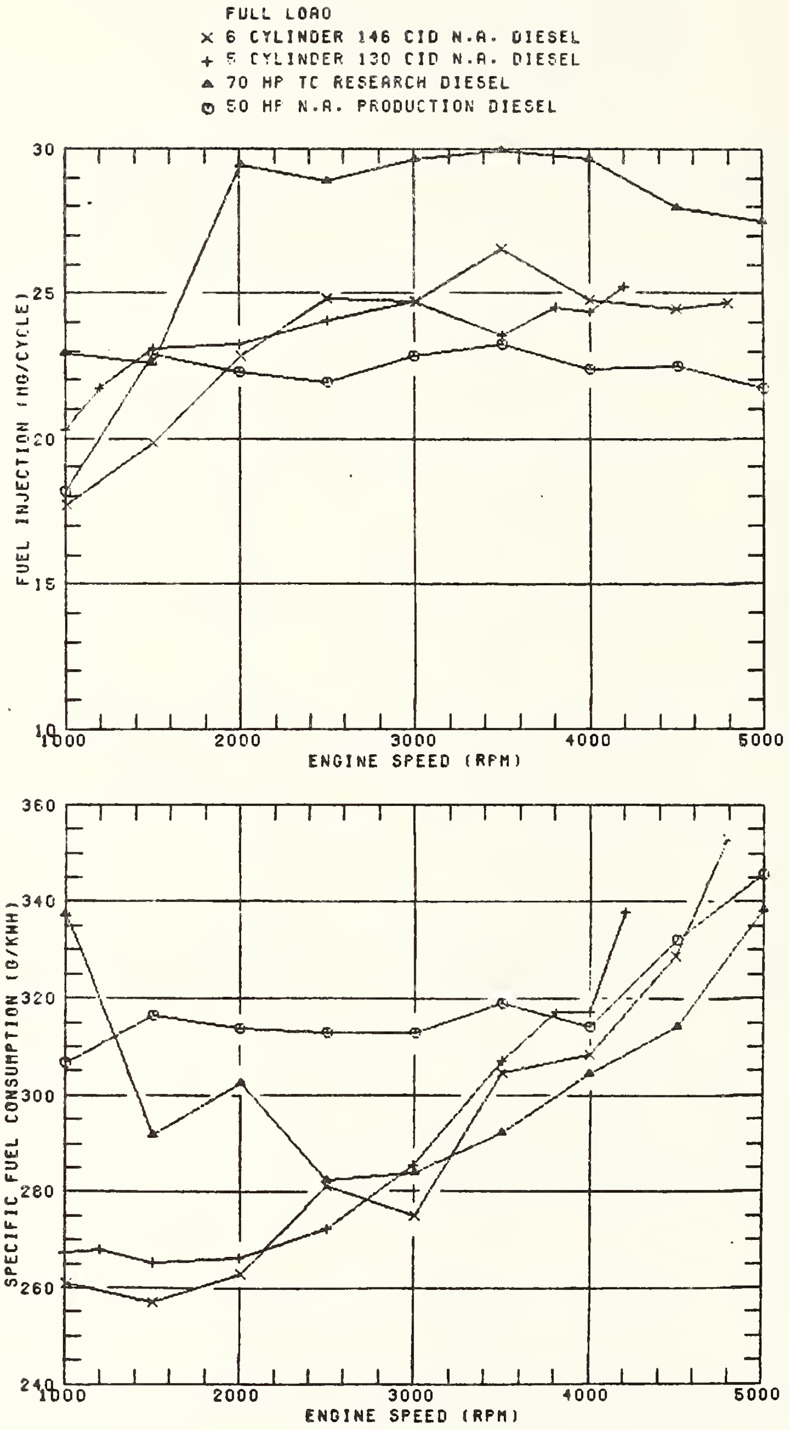


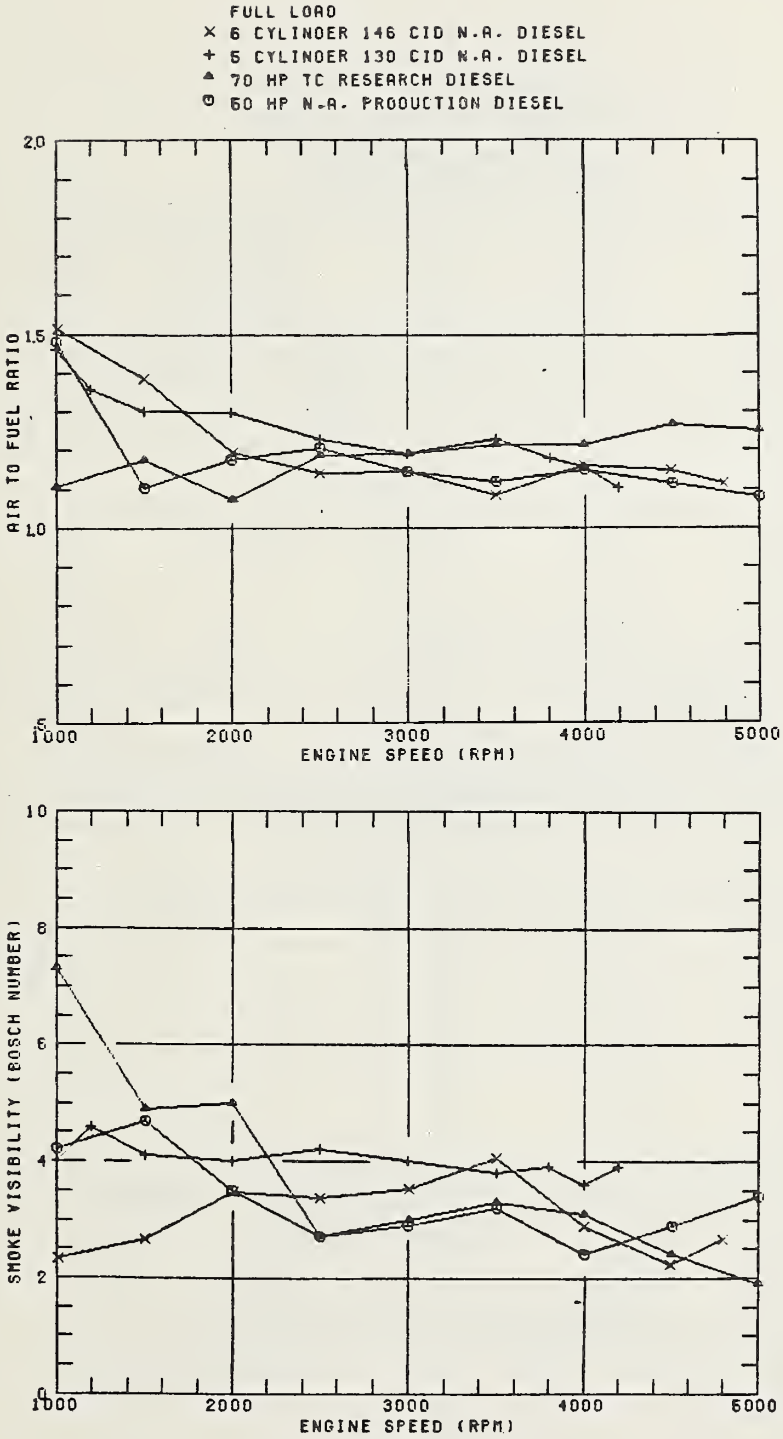
NO EMISSION (G/KWH)
50 HP DIESEL, FUEL 16086

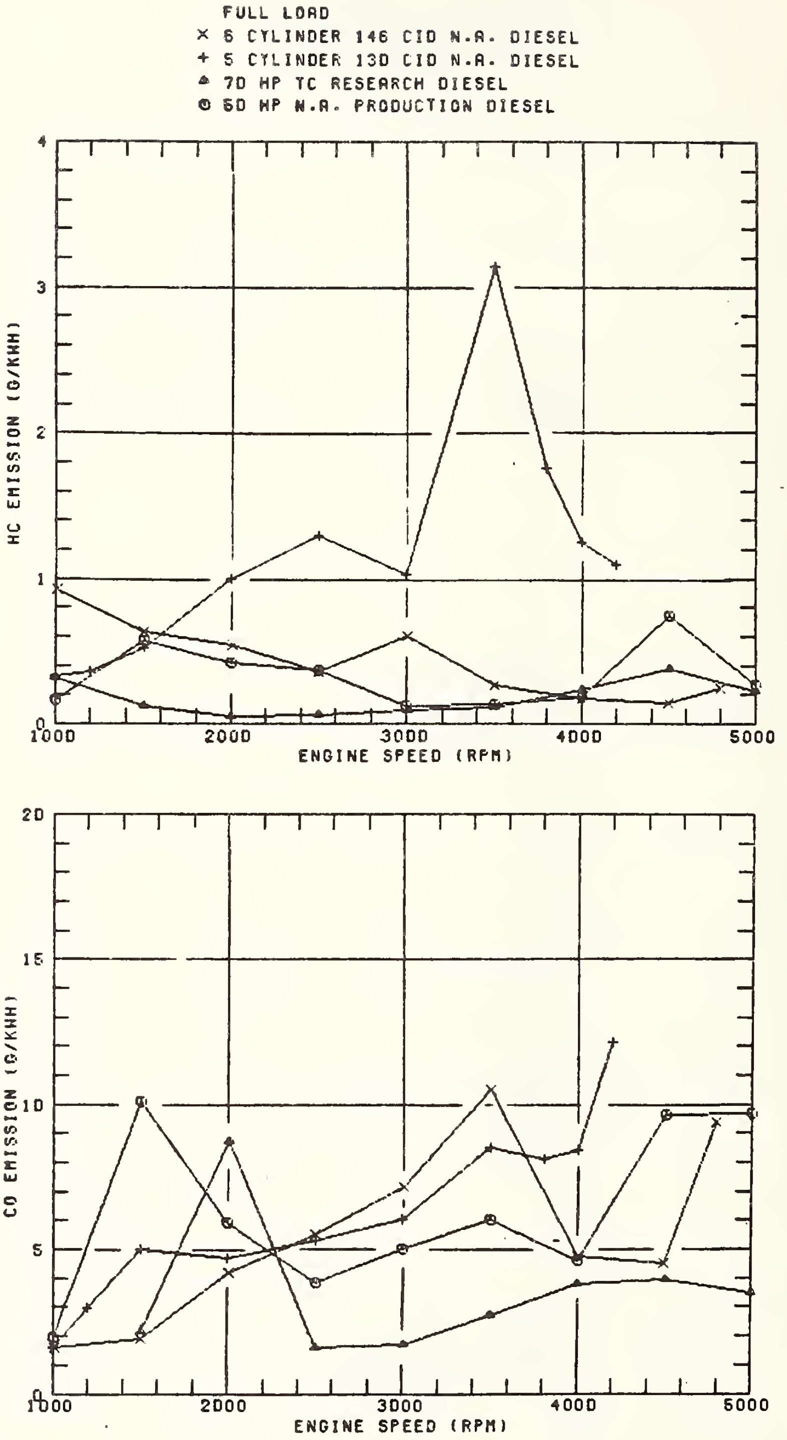


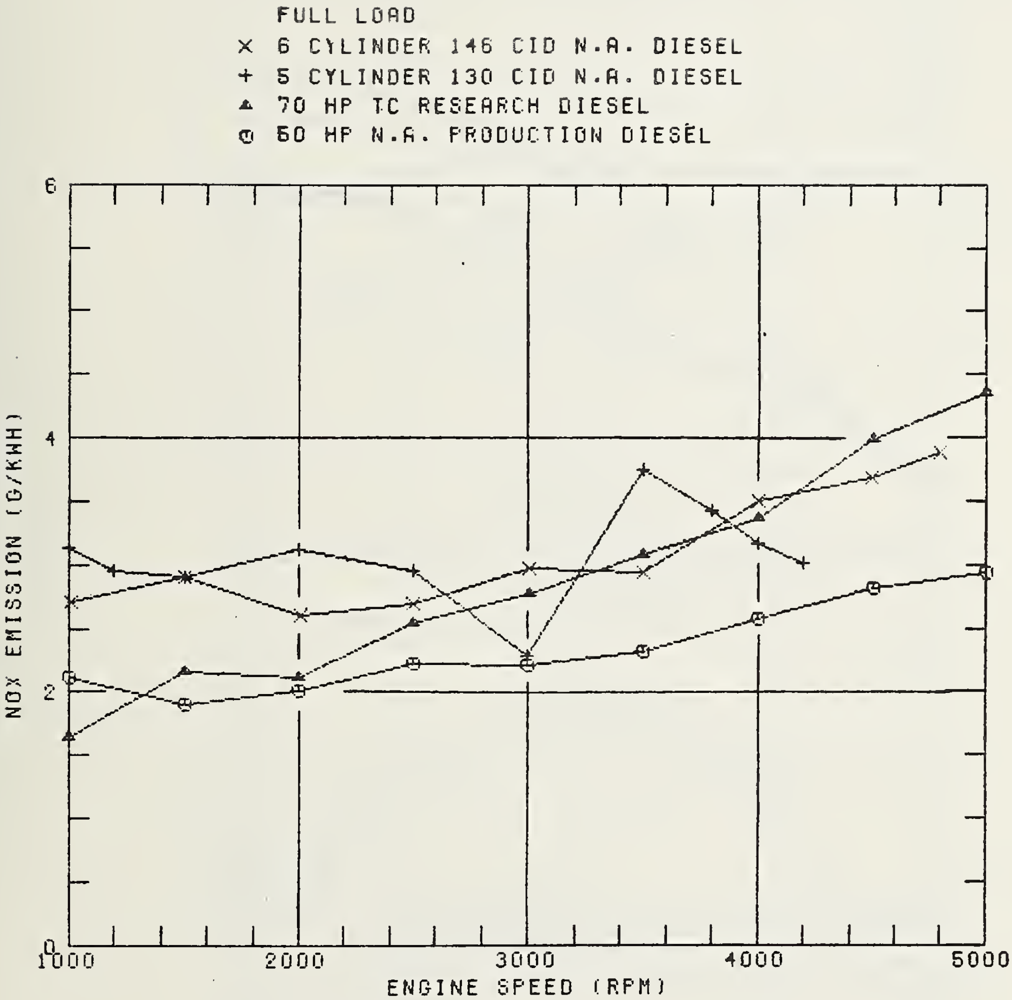
NO CONCENTRATION (PPM)
50 HP DIESEL, FUEL 16086

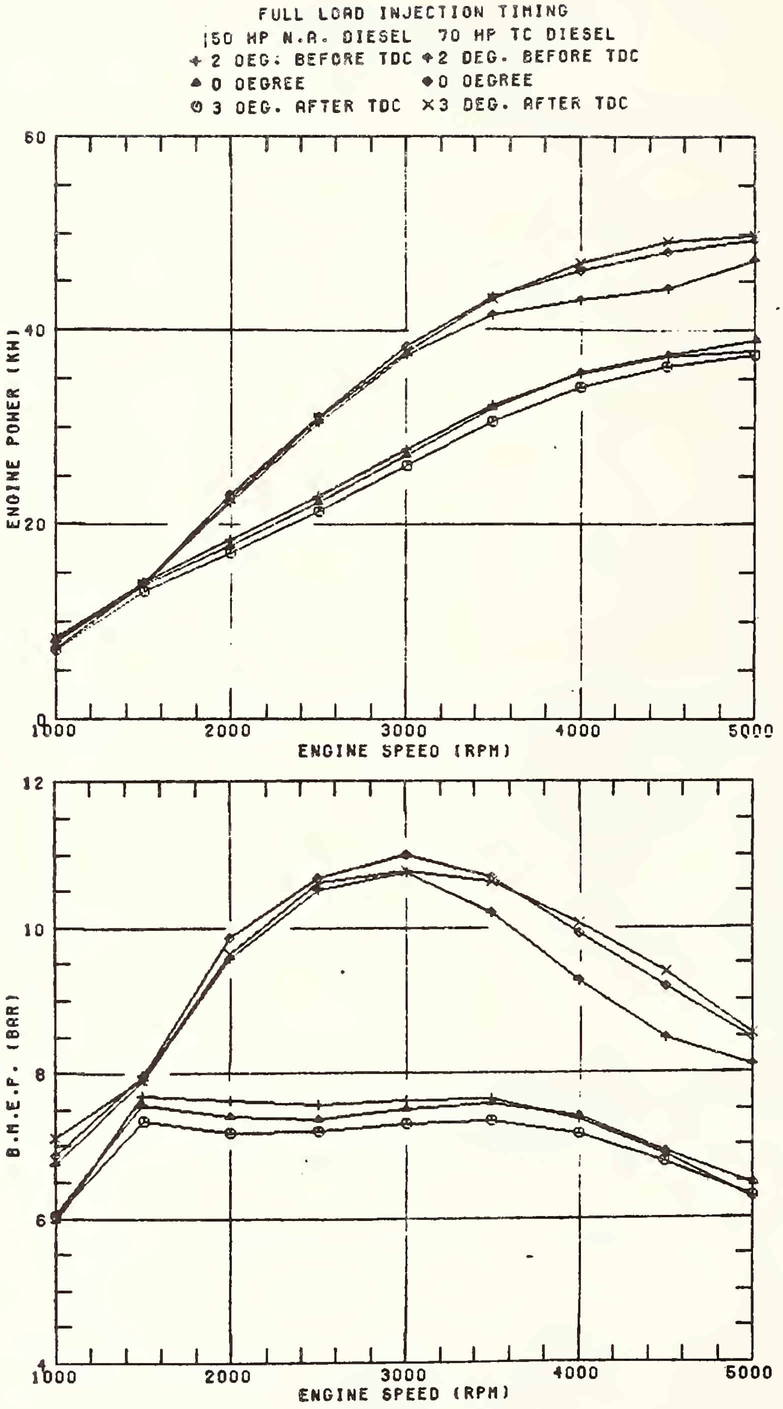

FULL LOAD
PROJECTED 8 CYLINDER N.A. DIESEL
PROJECTED 6 CYLINDER TC DIESEL
6 CYLINDER 146 CID N.A. DIESEL
5 CYLINDER 130 CID N.A. DIESEL
70 HP TC RESEARCH DIESEL
50 HP N.A. PRODUCTION DIESEL
80
60
40
20
0
ENGINE POWER (KW)
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
12
10
8
6
4
B.M.E.P. (BAR)
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

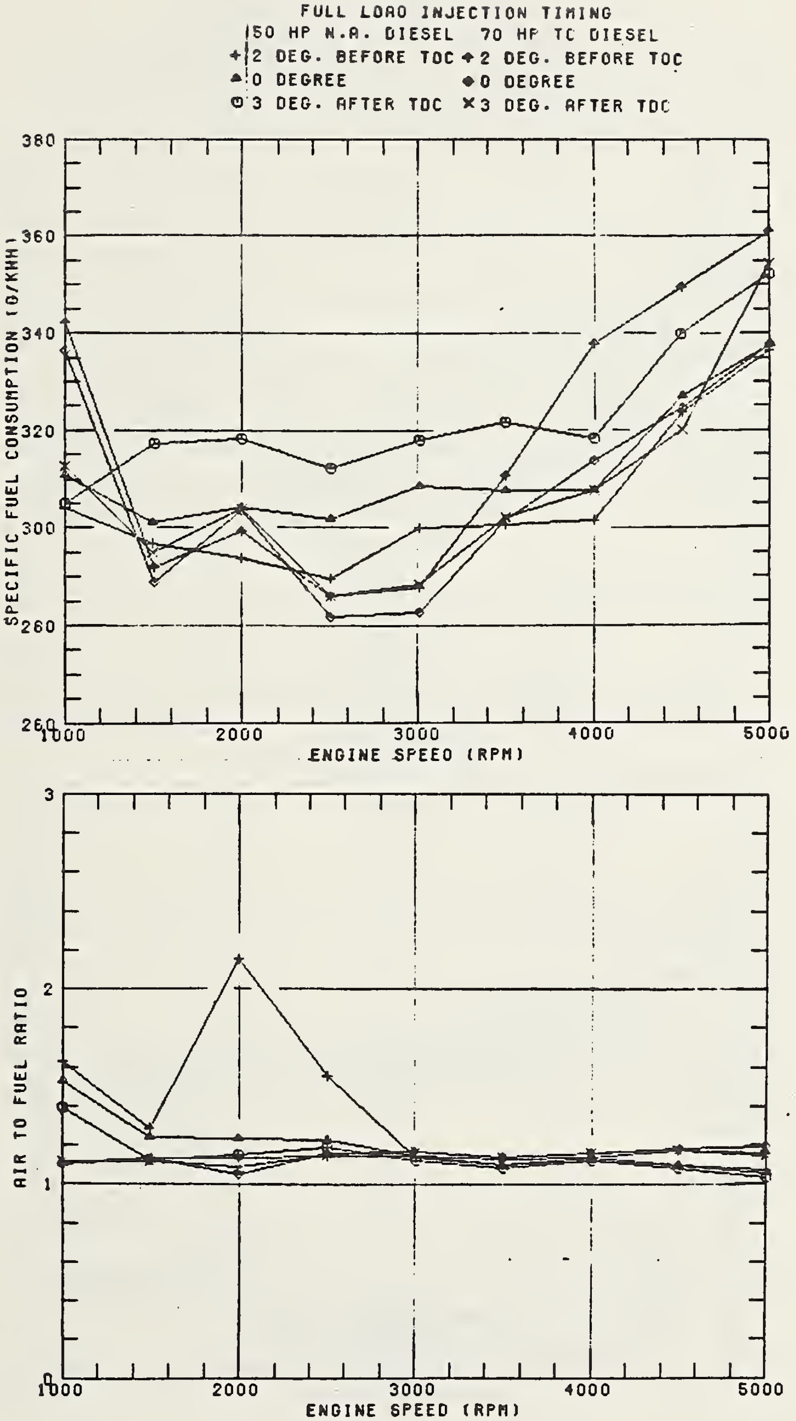

FULL LOAD
× 6 CYLINDER 146 CID N.A. DIESEL
+ 5 CYLINDER 130 CID N.A. DIESEL
▲ 70 HP TC RESEARCH DIESEL
⊙ 50 HP N.A. PRODUCTION DIESEL
FUEL INJECTION (MG/CYCLE)
30
25
20
15
10
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
SPECIFIC FUEL CONSUMPTION (G/KWH)
360
340
320
300
280
260
240
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

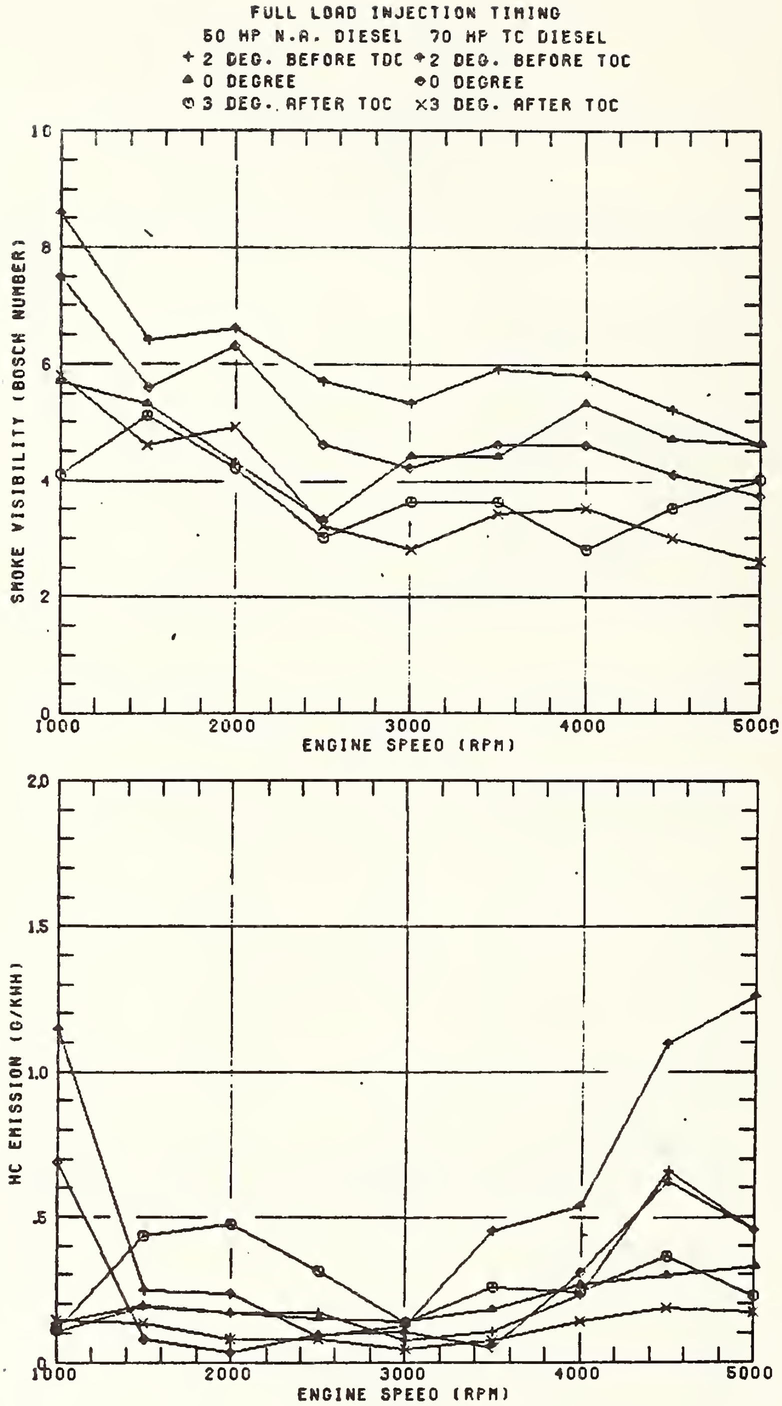

FULL LOAD
× 6 CYLINDER 146 CID N.A. DIESEL
+ 5 CYLINDER 130 CID N.A. DIESEL
▲ 70 HP TC RESEARCH DIESEL
⊖ 60 HP N.A. PRODUCTION DIESEL
AIR TO FUEL RATIO
2.0
1.5
1.0
.5
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
SMOKE VISIBILITY (BOSCH NUMBER)
10
8
6
4
2
0
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

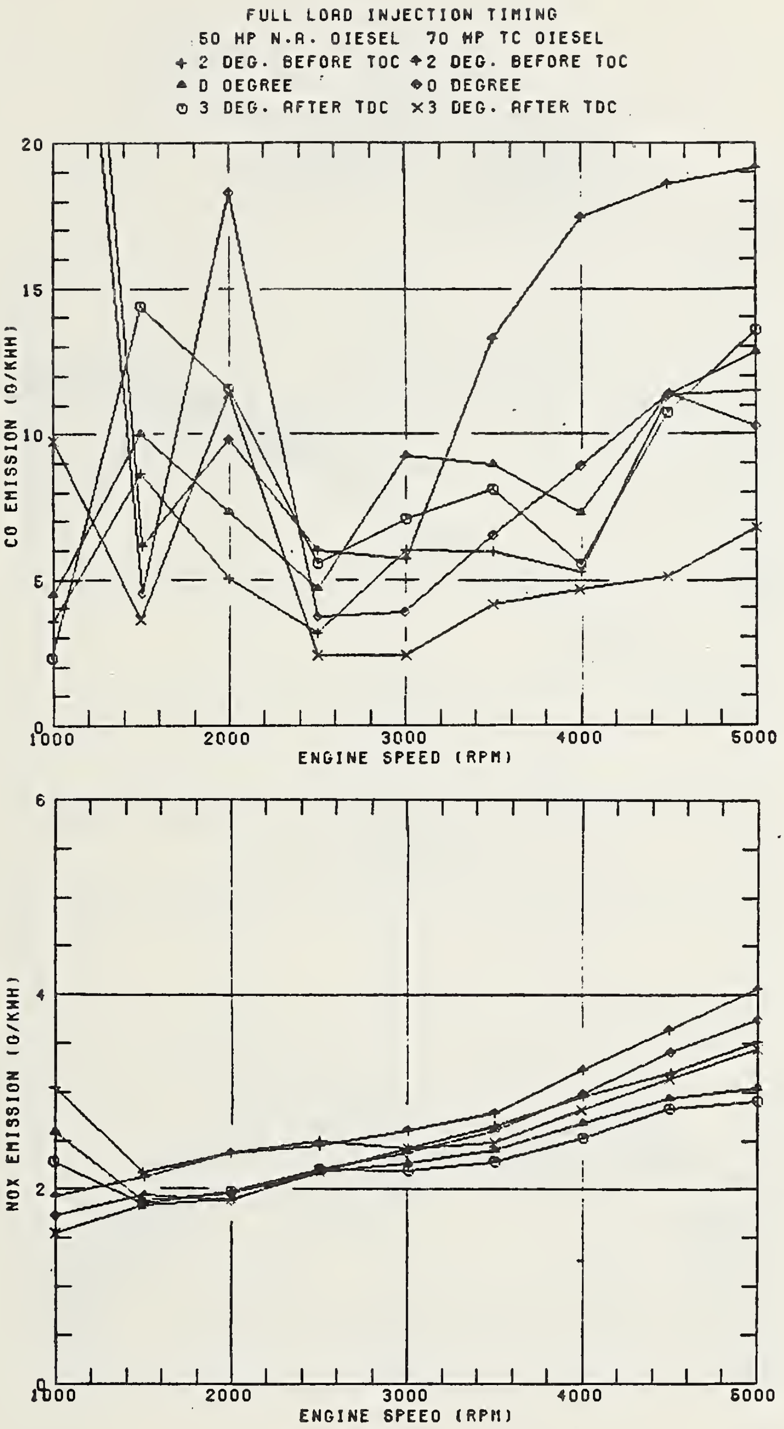

FULL LOAD
× 6 CYLINDER 146 CID N.A. DIESEL
+ 5 CYLINDER 130 CID N.A. DIESEL
▲ 70 HP TC RESEARCH DIESEL
⊕ 60 HP N.A. PRODUCTION DIESEL
HC EMISSION (G/KWH)
0
1
2
3
4
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
CO EMISSION (G/KWH)
0
5
10
15
20
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

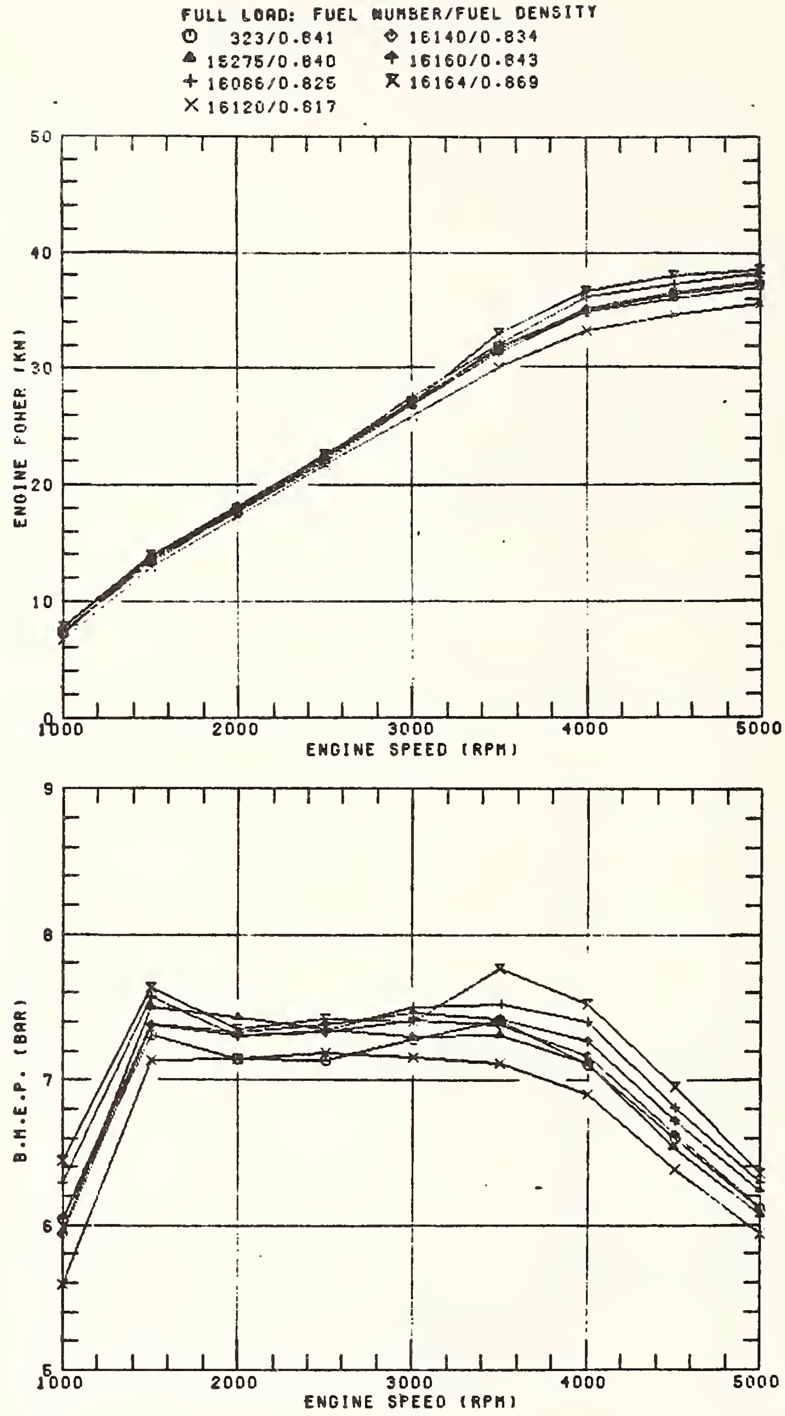

FULL LOAD
× 6 CYLINDER 146 CID N.A. DIESEL
+ 5 CYLINDER 130 CID N.A. DIESEL
▲ 70 HP TC RESEARCH DIESEL
⊙ 50 HP N.A. PRODUCTION DIESEL
6
4
2
0
NOX EMISSION (G/KWH)
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

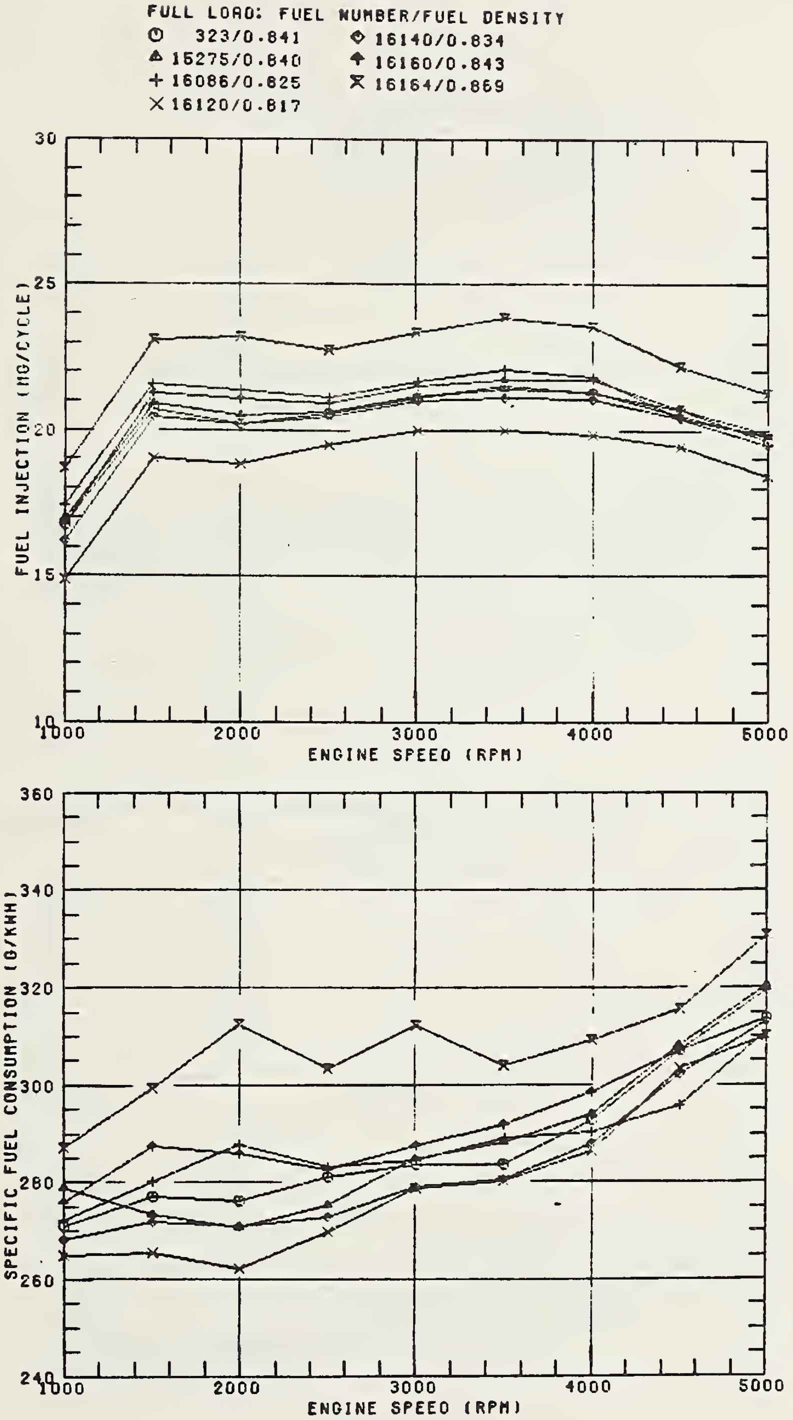

FULL LOAD INJECTION TIMING
150 HP N.A. DIESEL
70 HP TC DIESEL
+ 2 DEG. BEFORE TDC
▲ 0 DEGREE
⊕ 3 DEG. AFTER TDC
◆ 2 DEG. BEFORE TDC
◆ 0 DEGREE
× 3 DEG. AFTER TDC
ENGINE POWER (KW)
60
40
20
0
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
B.M.E.P. (BAR)
12
10
8
6
4
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

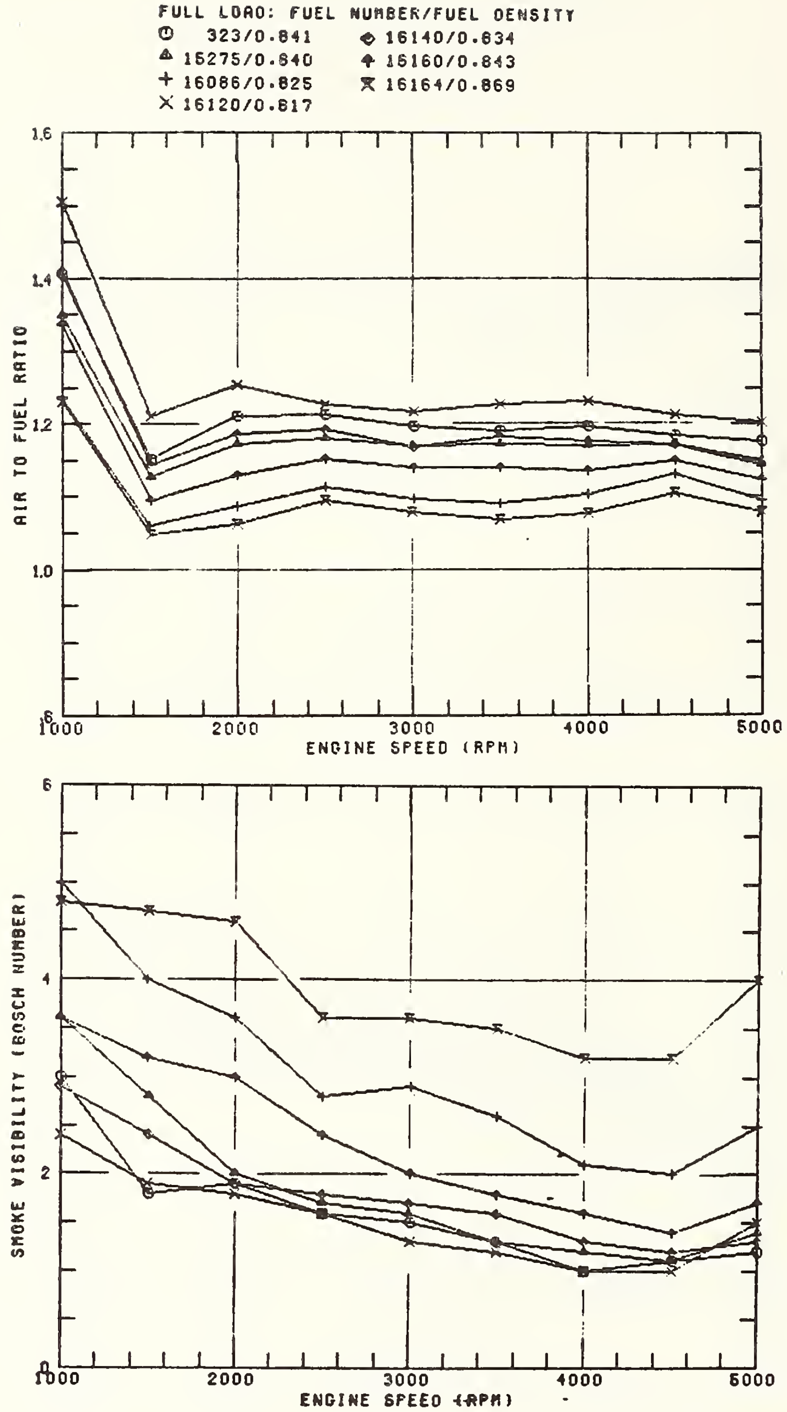

FULL LOAD INJECTION TIMING
50 HP N.A. DIESEL
70 HP TC DIESEL
+ 2 DEG. BEFORE TDC
✦ 2 DEG. BEFORE TDC
▲ 0 DEGREE
◆ 0 DEGREE
⊙ 3 DEG. AFTER TDC
× 3 DEG. AFTER TDC
SPECIFIC FUEL CONSUMPTION (G/KWH)
380
360
340
320
300
260
260
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
AIR TO FUEL RATIO
3
2
1
0
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

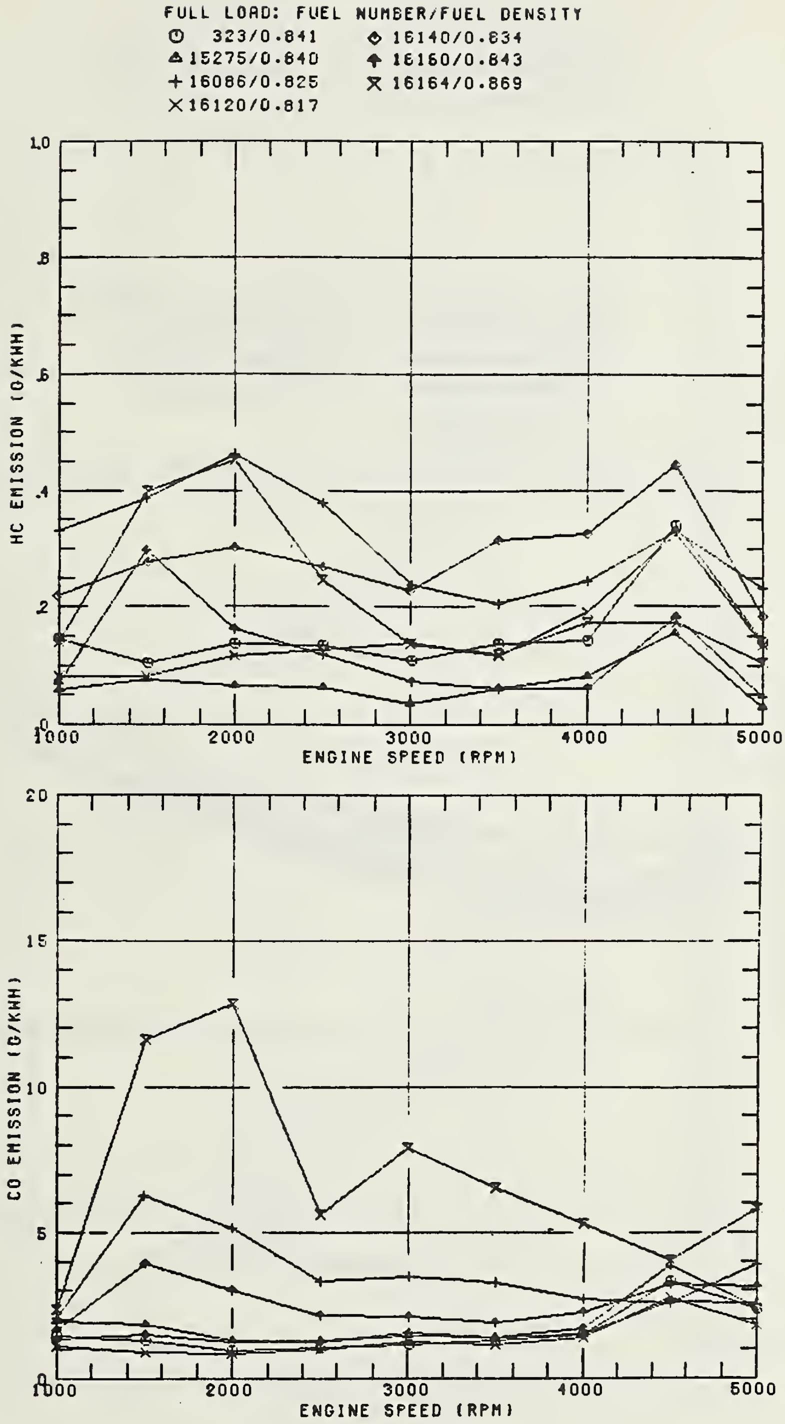

FULL LOAD INJECTION TIMING
50 HP N.A. DIESEL
70 HP TC DIESEL
+ 2 DEG. BEFORE TDC
◆ 2 DEG. BEFORE TDC
▲ 0 DEGREE
● 0 DEGREE
⊕ 3 DEG. AFTER TDC
× 3 DEG. AFTER TDC
SMOKE VISIBILITY (BOSCH NUMBER)
0
2
4
6
8
10
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
HC EMISSION (G/KWH)
0
.5
1.0
1.5
2.0
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

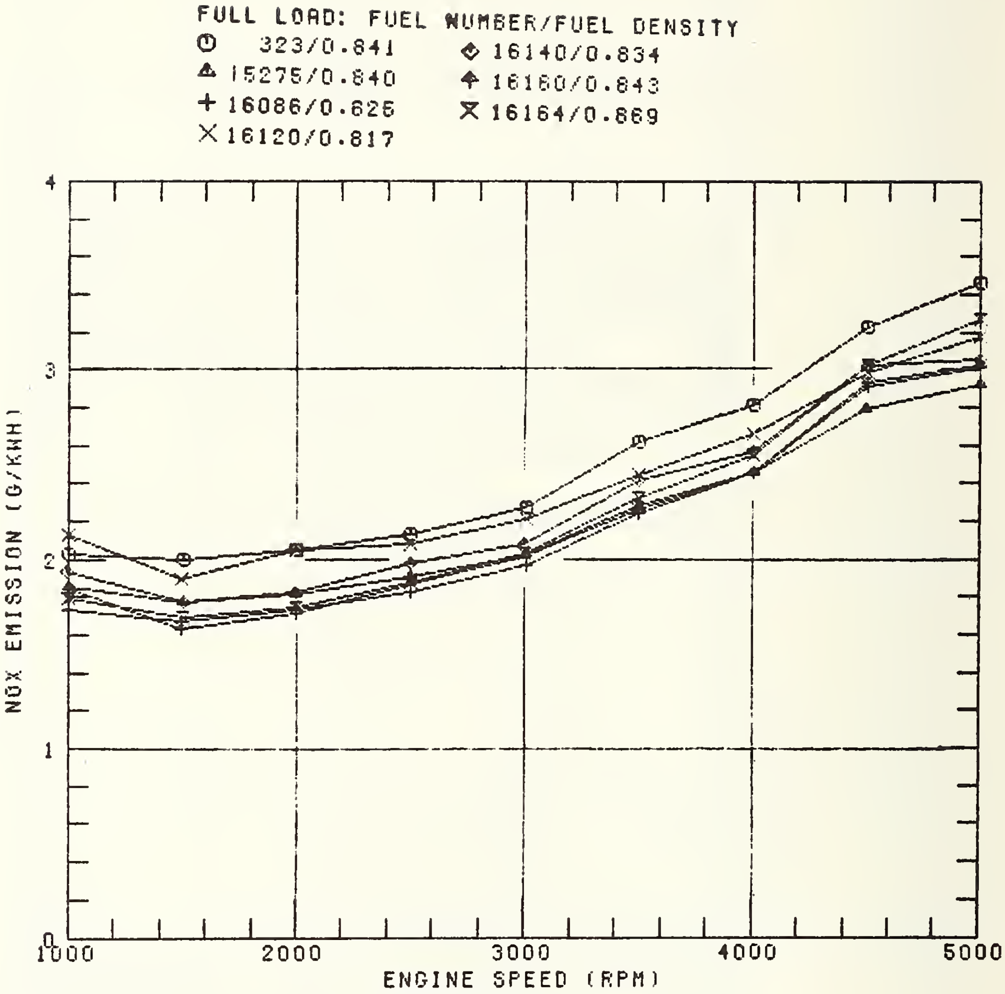

FULL LOAD INJECTION TIMING
50 HP N.A. DIESEL 70 HP TC DIESEL
+ 2 DEG. BEFORE TDC ✦2 DEG. BEFORE TDC
▲ 0 DEGREE ◆0 DEGREE
⊙ 3 DEG. AFTER TDC ×3 DEG. AFTER TDC
CO EMISSION (G/KWH)
0
5
10
15
20
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
NOX EMISSION (G/KWH)
0
2
4
6
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

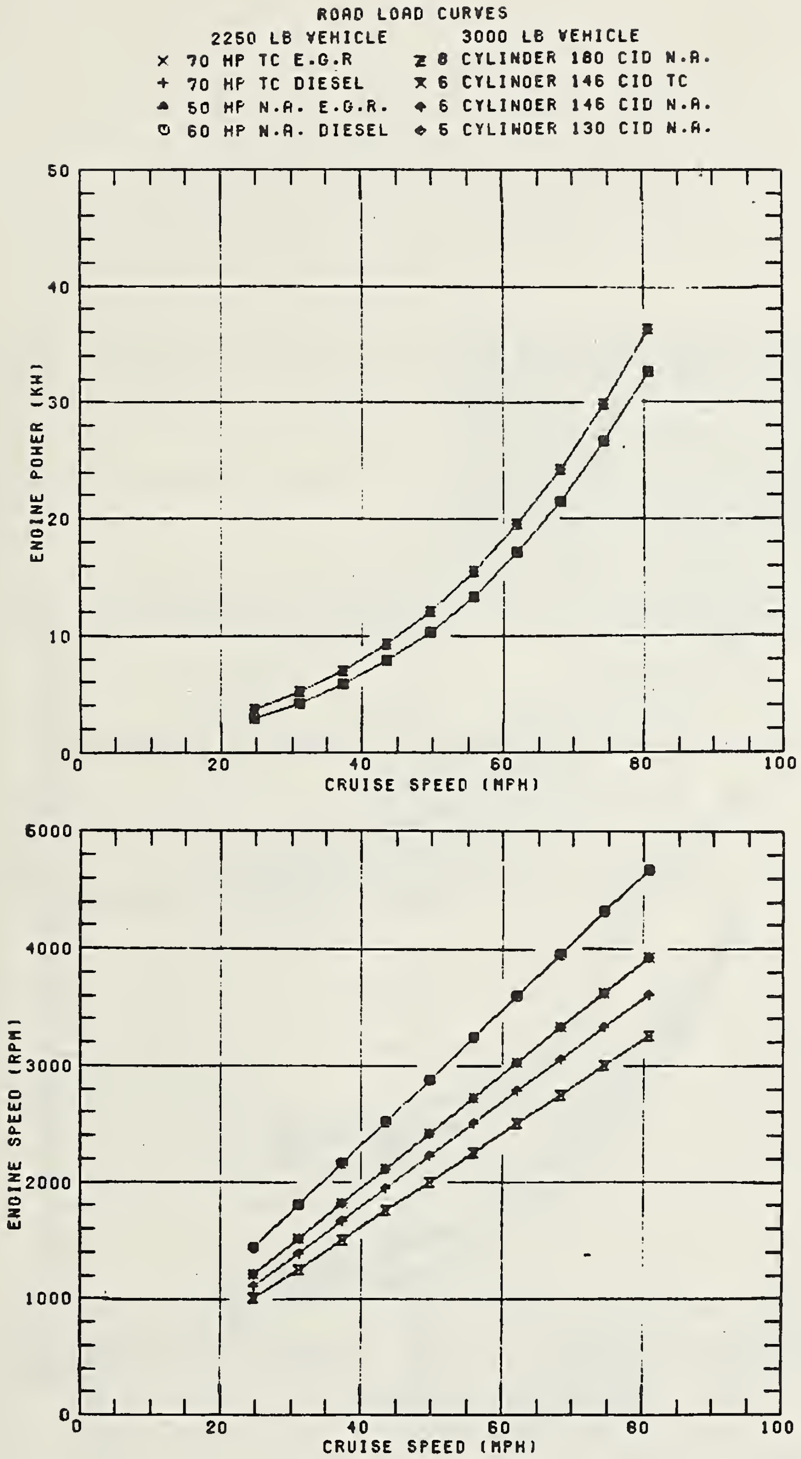

FULL LOAD: FUEL NUMBER/FUEL DENSITY
323/0.841
16140/0.834
15275/0.840
16160/0.843
16066/0.825
16164/0.869
16120/0.817
ENGINE POWER (KW)
0
10
20
30
40
50
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
B.M.E.P. (BAR)
5
6
7
8
9
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

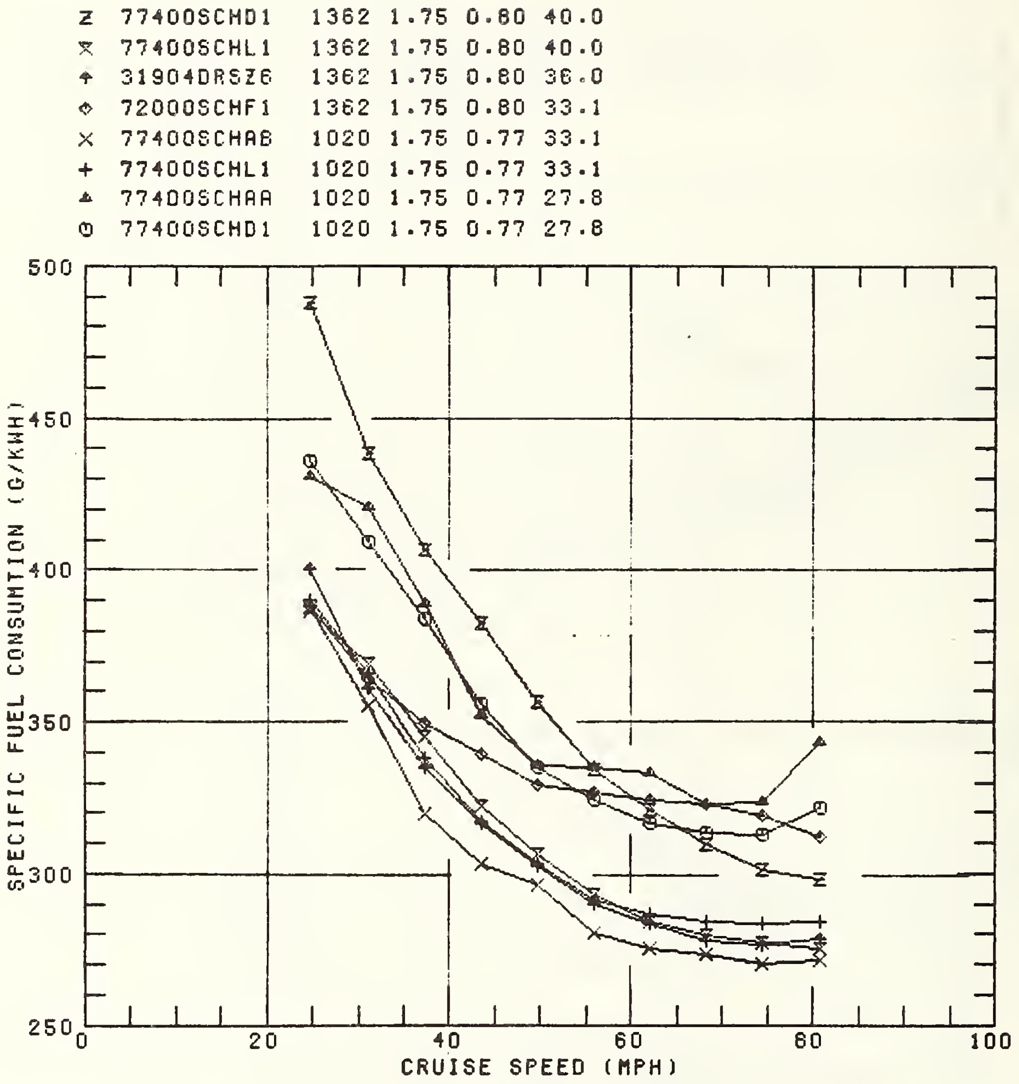

FULL LOAD: FUEL NUMBER/FUEL DENSITY
323/0.841
15275/0.840
16086/0.825
16120/0.817
16140/0.834
16160/0.843
16164/0.869
30
25
20
15
10
FUEL INJECTION (MG/CYCLE)
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
360
340
320
300
280
260
240
SPECIFIC FUEL CONSUMPTION (G/KWH)
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)


FULL LOAD: FUEL NUMBER/FUEL DENSITY
○ 323/0.841
△ 15275/0.840
+ 16086/0.825
× 16120/0.817
◇ 16140/0.834
♦ 16160/0.843
⊼ 16164/0.869
AIR TO FUEL RATIO
1.6
1.4
1.2
1.0
.8
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
SMOKE VISIBILITY (BOSCH NUMBER)
6
4
2
0
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

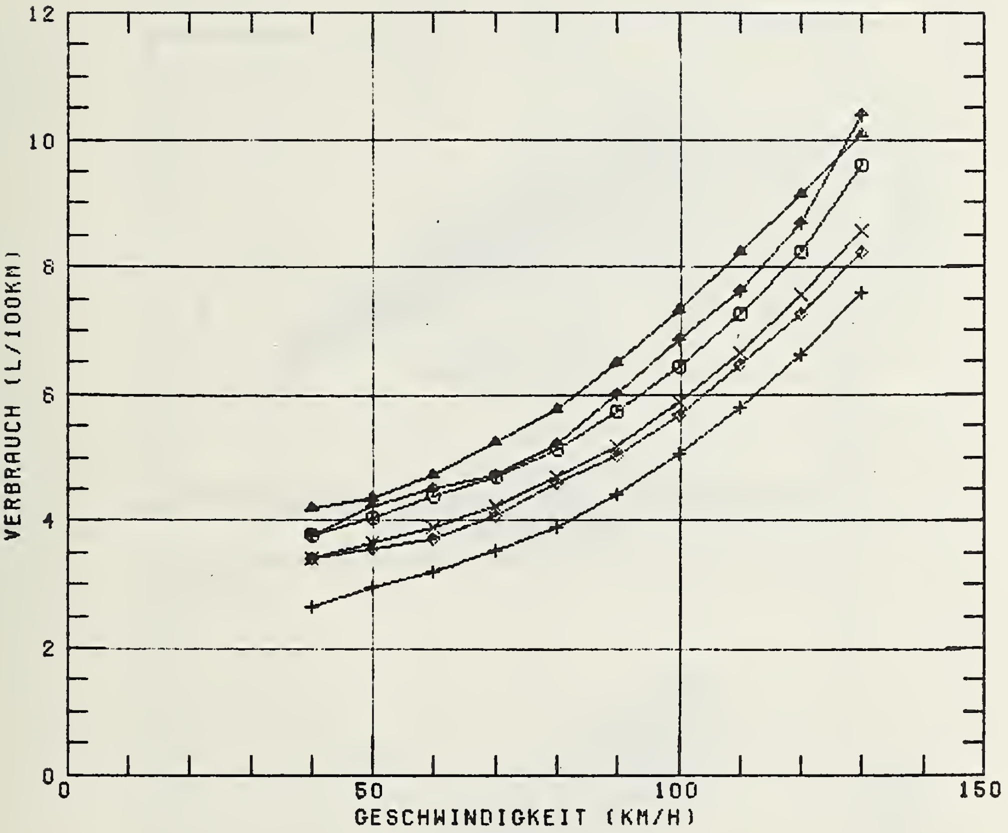

FULL LOAD: FUEL NUMBER/FUEL DENSITY
⊙ 323/0.841
◇ 16140/0.834
△ 15275/0.840
✦ 16160/0.843
+ 16086/0.825
⊼ 16164/0.869
× 16120/0.817
HC EMISSION (G/KWH)
1.0
.8
.6
.4
.2
0
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)
CO EMISSION (G/KWH)
20
15
10
5
0
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)


FULL LOAD: FUEL NUMBER/FUEL DENSITY
○ 323/0.841
△ 15275/0.840
+ 16086/0.626
× 16120/0.817
◇ 16140/0.834
↑ 16160/0.843
⧖ 16164/0.869
NOX EMISSION (G/KWH)
0
1
2
3
4
1000
2000
3000
4000
5000
ENGINE SPEED (RPM)

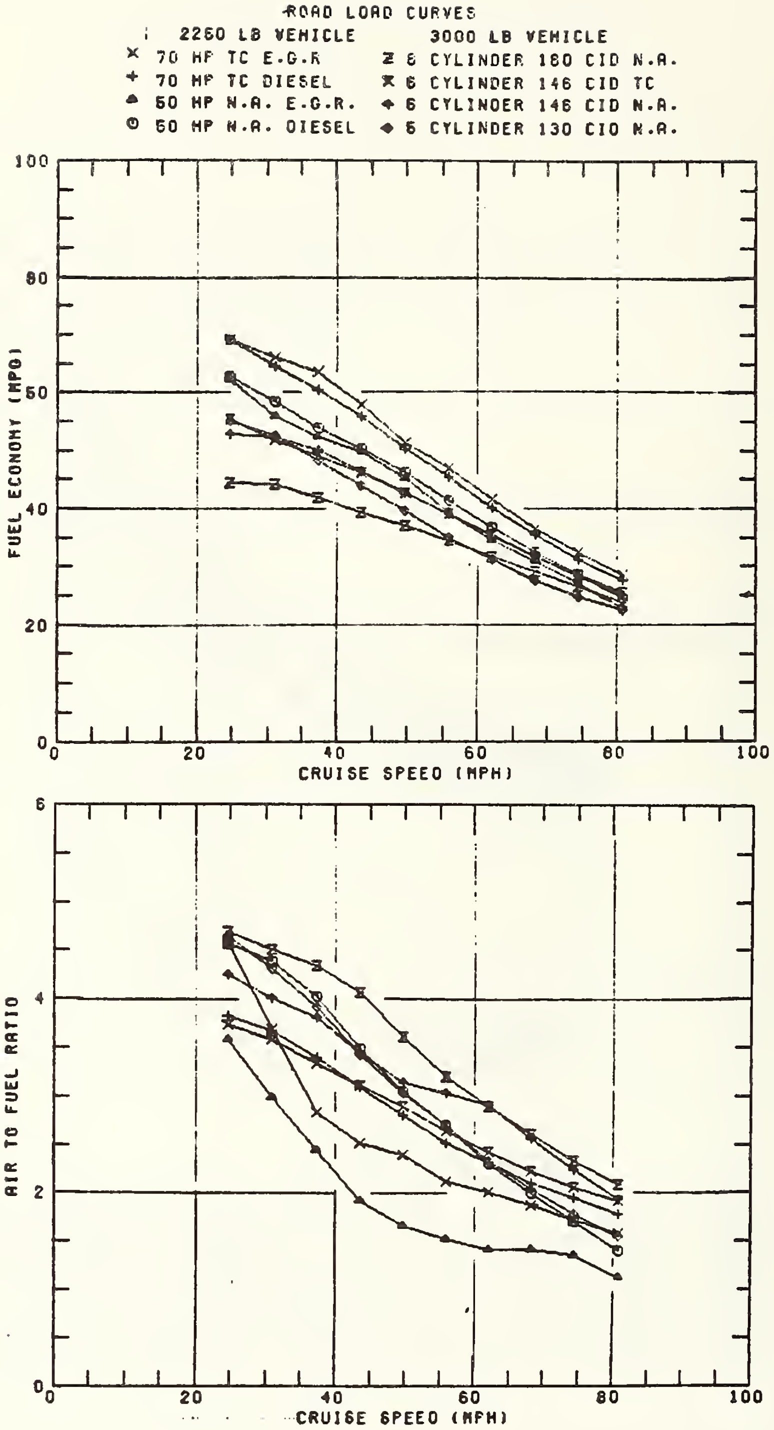

ROAD LOAD CURVES
2250 LB VEHICLE
3000 LB VEHICLE
× 70 HP TC E.G.R
+ 70 HP TC DIESEL
▲ 50 HP N.A. E.G.R.
○ 60 HP N.A. DIESEL
⧗ 8 CYLINDER 180 CID N.A.
✱ 6 CYLINDER 146 CID TC
◆ 6 CYLINDER 146 CID N.A.
◇ 6 CYLINDER 130 CID N.A.
ENGINE POWER (KW)
0
10
20
30
40
50
CRUISE SPEED (MPH)
0
20
40
60
80
100
ENGINE SPEED (RPM)
0
1000
2000
3000
4000
5000
CRUISE SPEED (MPH)
0
20
40
60
80
100



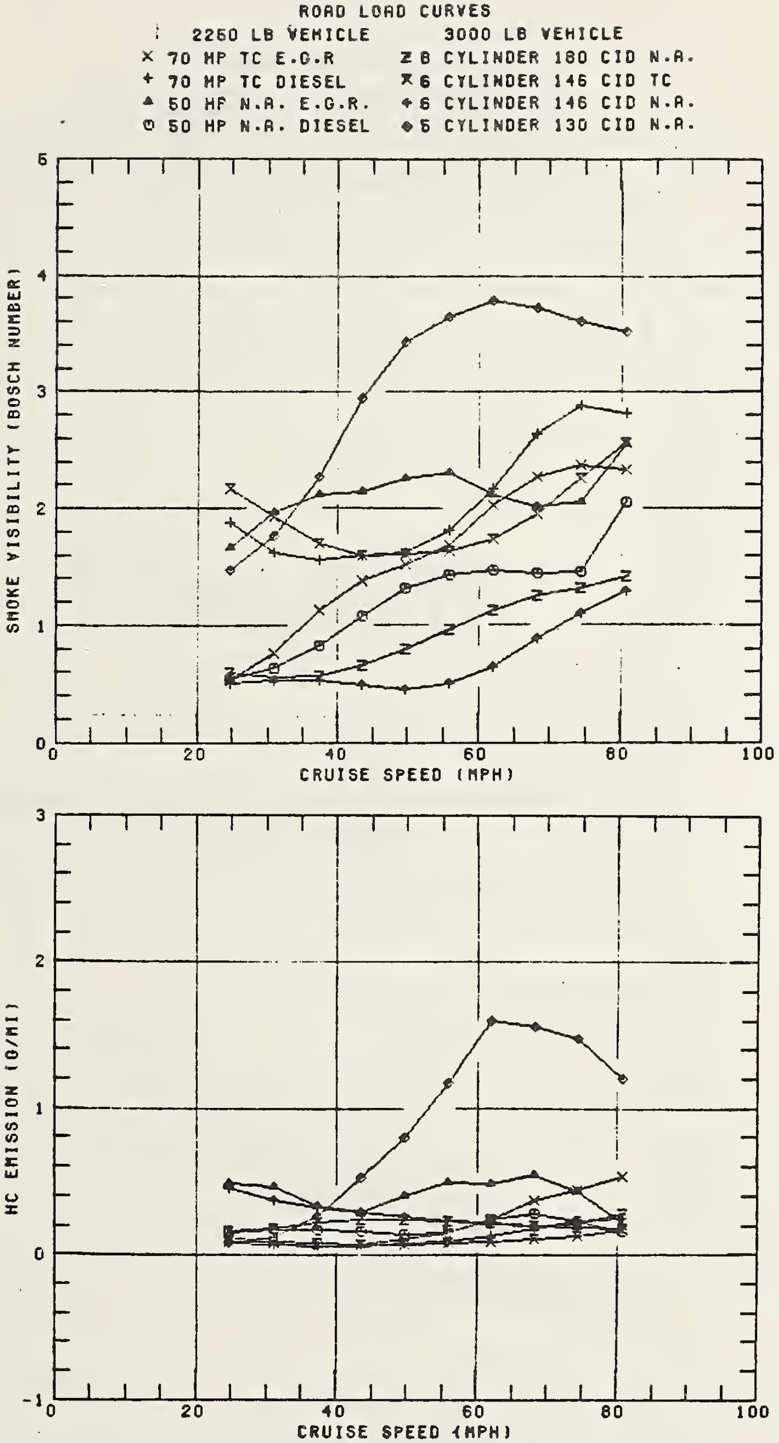
Z 77400SCHD1 1362 1.75 0.80 40.0
77400SCHL1 1362 1.75 0.80 40.0
31904DRSZ6 1362 1.75 0.80 36.0
◇ 72000SCHF1 1362 1.75 0.80 33.1
× 77400SCHAB 1020 1.75 0.77 33.1
+ 77400SCHL1 1020 1.75 0.77 33.1
▲ 77400SCHAA 1020 1.75 0.77 27.8
⊙ 77400SCHD1 1020 1.75 0.77 27.8
500
450
400
350
300
250
SPECIFIC FUEL CONSUMTION (G/KWH)
0
20
40
60
80
100
CRUISE SPEED (MPH)

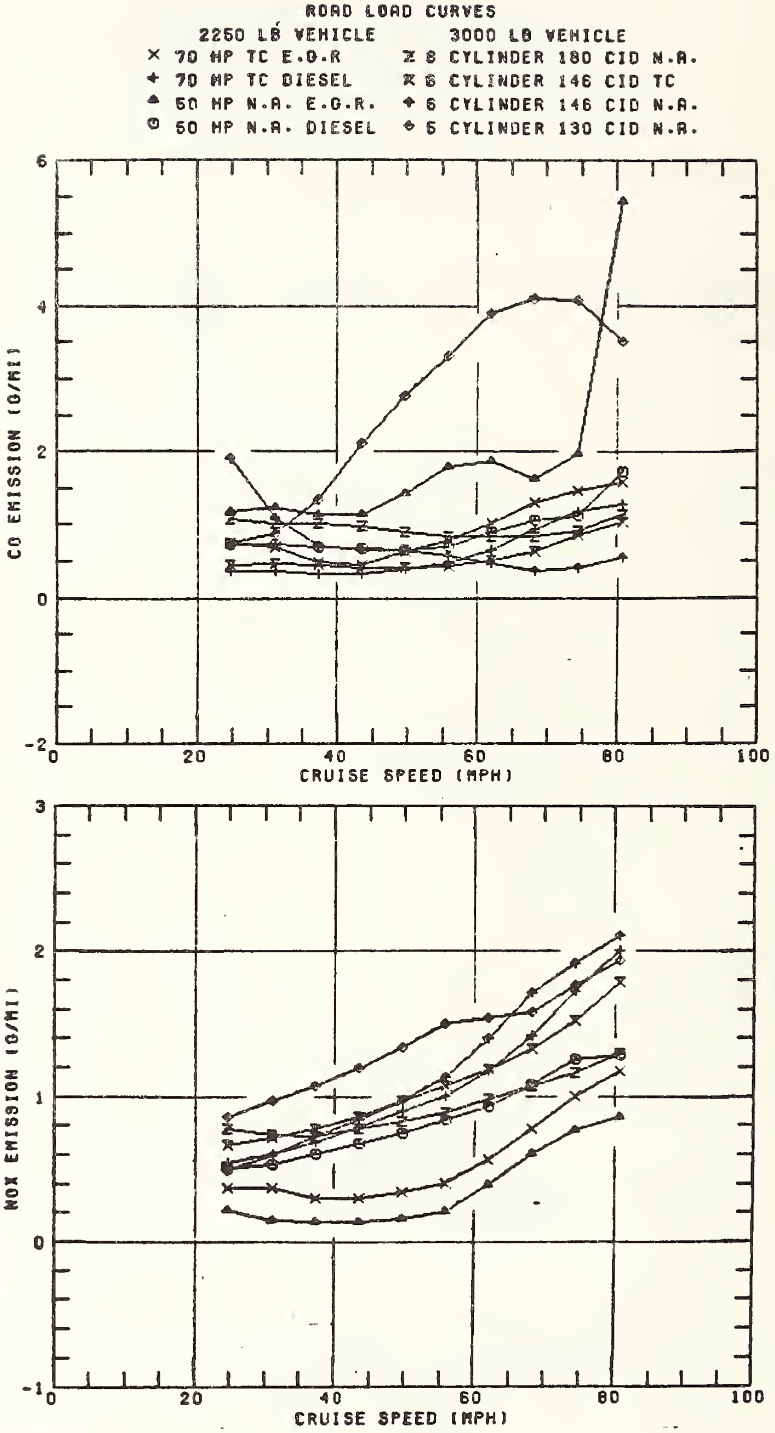


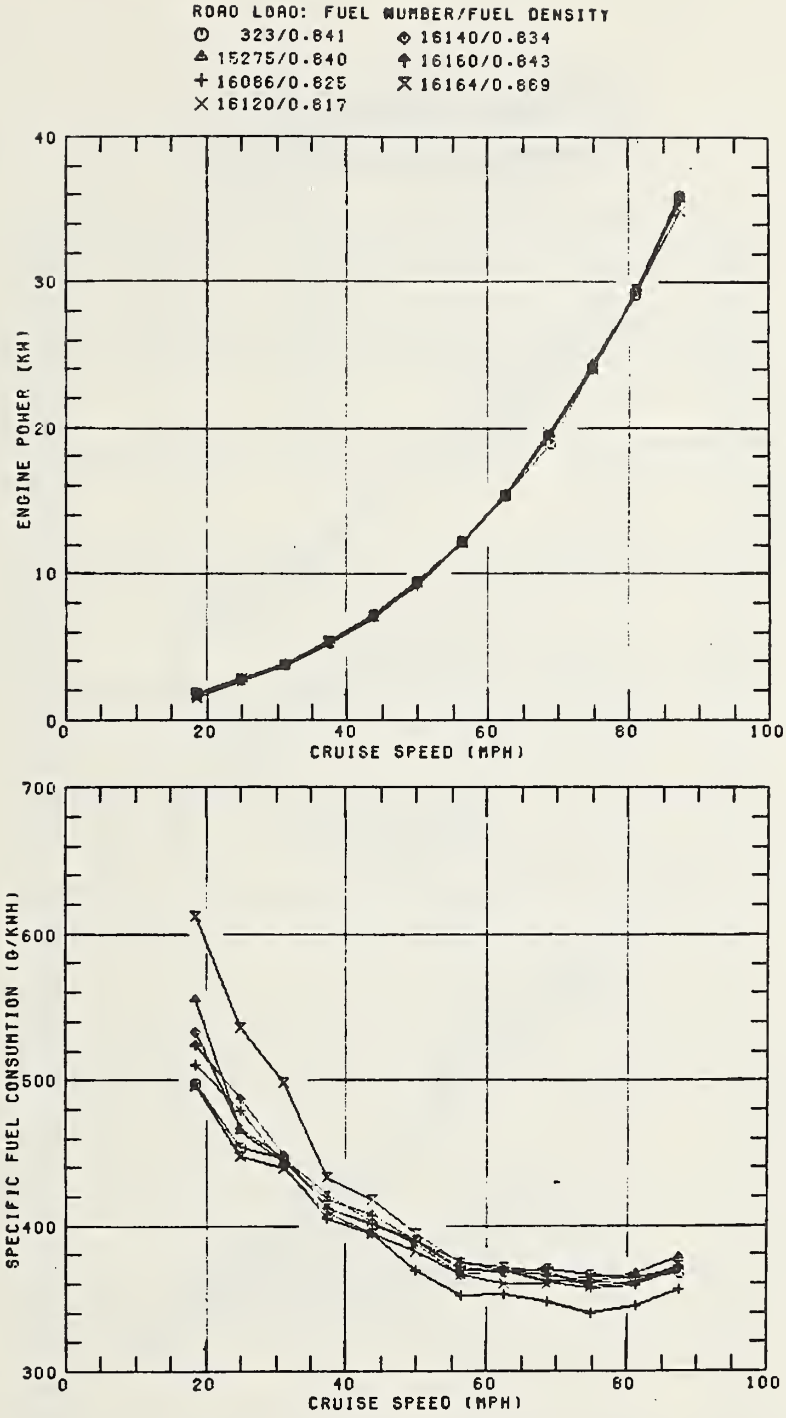
| | | | | | | ROAD LOAD |
|---|---|---|---|---|---|---|
| ✦ | 77400SCHA2 | 1020 | 1.75 | 0.77 | 27.8 | 60 HP N.A. PRODUCTION DIESEL WITH E.G.R. |
| ◇ | 77400SCHR2 | 1020 | 1.75 | 0.77 | 33.1 | 70 HP TC RESEARCH DIESEL WITH E.G.R. |
| + | 77400SCHL1 | 1020 | 1.75 | 0.77 | 33.1 | 70 HP TC RESEARCH DIESEL 5 SPEED TRANSM. |
| × | 77400SCHL1 | 1020 | 1.25 | 0.77 | 42.9 | 70 HP TC RESEARCH DIESEL |
| ▲ | 72000SCHF1 | 1250 | 1.75 | 0.77 | 33.1 | 5 CYLINDER 130 CID N.A. DIESEL |
| ⊙ | 77400SCHD1 | 1020 | 1.75 | 0.77 | 27.8 | 60 HP N.A. PRODUCTION DIESEL |

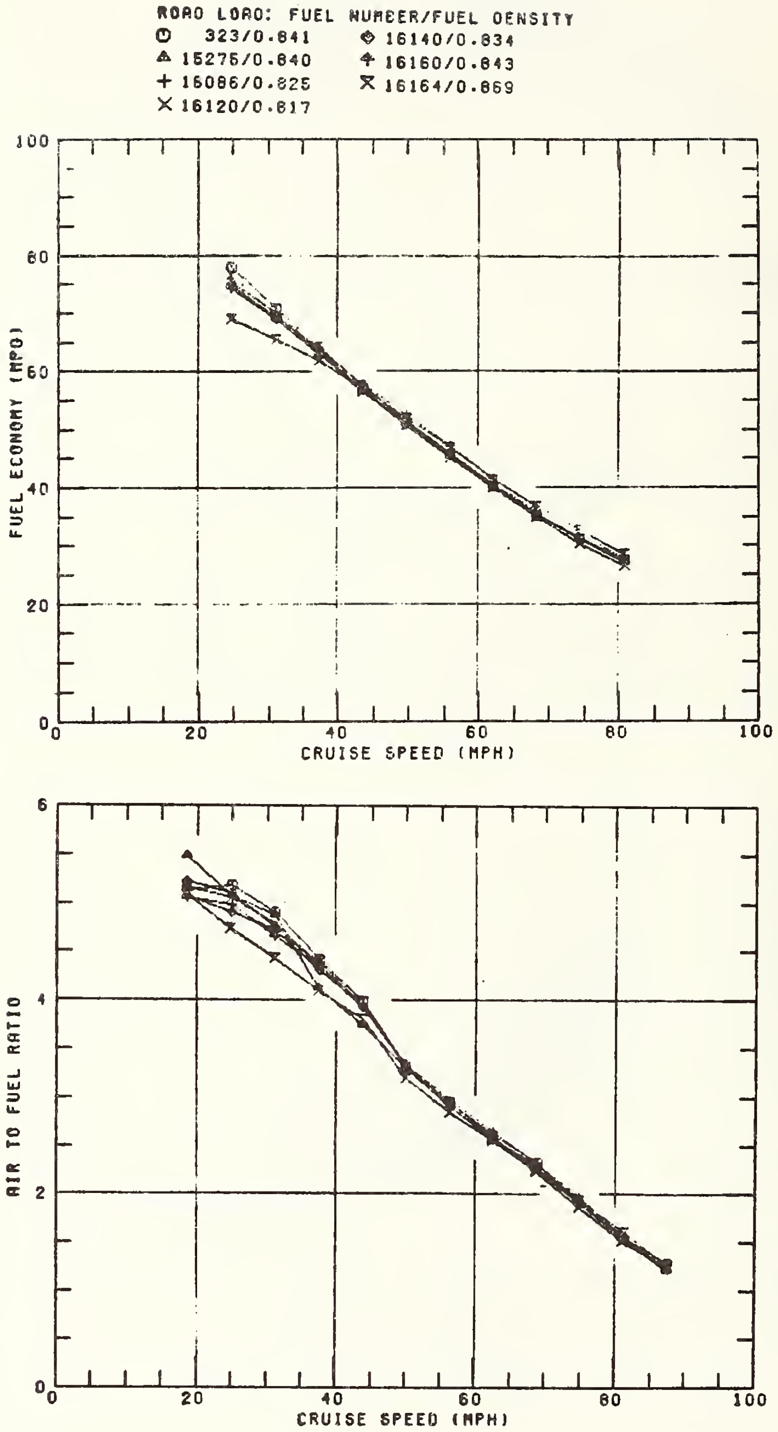


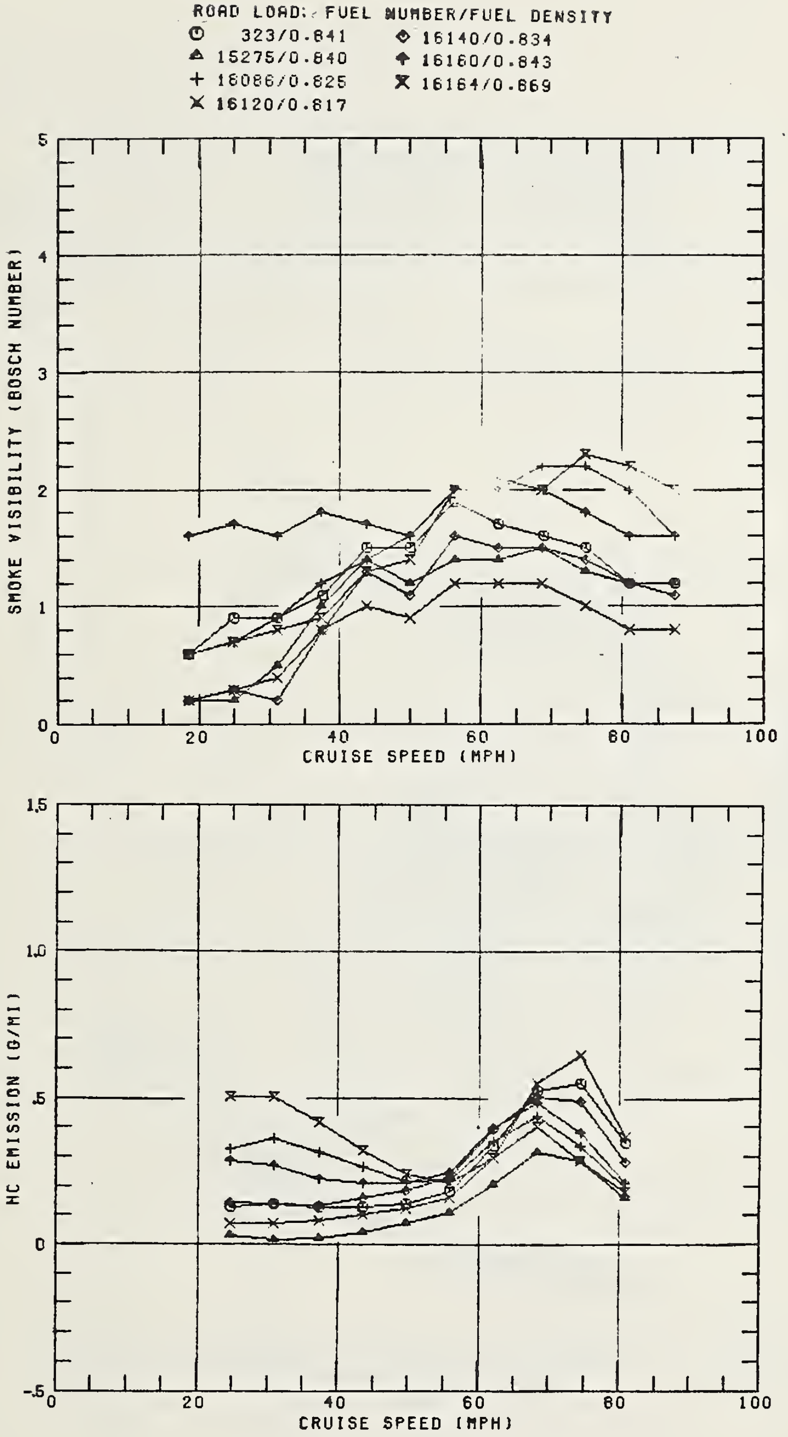
ROAD LOAD CURVES

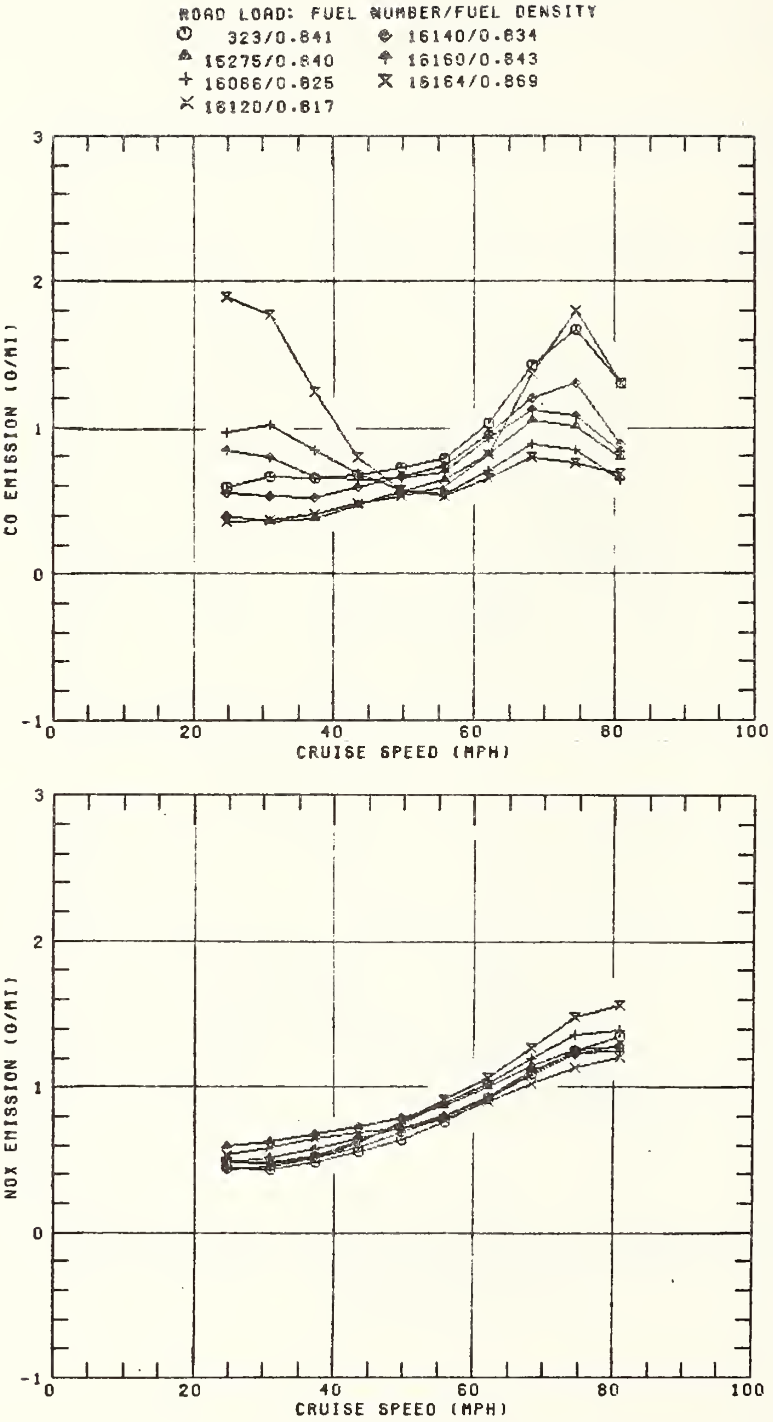

ROAD LOAD CURVES
2250 LB VEHICLE
3000 LB VEHICLE
× 70 HP TC E.G.R
+ 70 HP TC DIESEL
▲ 50 HP N.A. E.G.R.
⊖ 50 HP N.A. DIESEL
Z 8 CYLINDER 180 CID N.A.
6 CYLINDER 146 CID TC
6 CYLINDER 146 CID N.A.
◆ 5 CYLINDER 130 CID N.A.
SMOKE VISIBILITY (BOSCH NUMBER)
0
1
2
3
4
5
0
20
40
60
80
100
CRUISE SPEED (MPH)
HC EMISSION (G/MI)
-1
0
1
2
3
0
20
40
60
80
100
CRUISE SPEED (MPH)


ROAD LOAD CURVES
2250 LB VEHICLE
3000 LB VEHICLE
× 70 HP TC E.G.R
+ 70 HP TC DIESEL
▲ 50 HP N.A. E.G.R.
⊕ 50 HP N.A. DIESEL
8 CYLINDER 180 CID N.A.
6 CYLINDER 146 CID TC
6 CYLINDER 146 CID N.A.
5 CYLINDER 130 CID N.A.
CO EMISSION (G/MI)
6
4
2
0
-2
0
20
40
60
80
100
CRUISE SPEED (MPH)
NOX EMISSION (G/MI)
3
2
1
0
-1
0
20
40
60
80
100
CRUISE SPEED (MPH)


ROAD LOAD: FUEL NUMBER/FUEL DENSITY
323/0.841
15275/0.840
16086/0.825
16120/0.817
16140/0.834
16160/0.843
16164/0.869
ENGINE POWER (KW)
40
30
20
10
0
0
20
40
60
80
100
CRUISE SPEED (MPH)
SPECIFIC FUEL CONSUMTION (G/KWH)
700
600
500
400
300
0
20
40
60
80
100
CRUISE SPEED (MPH)

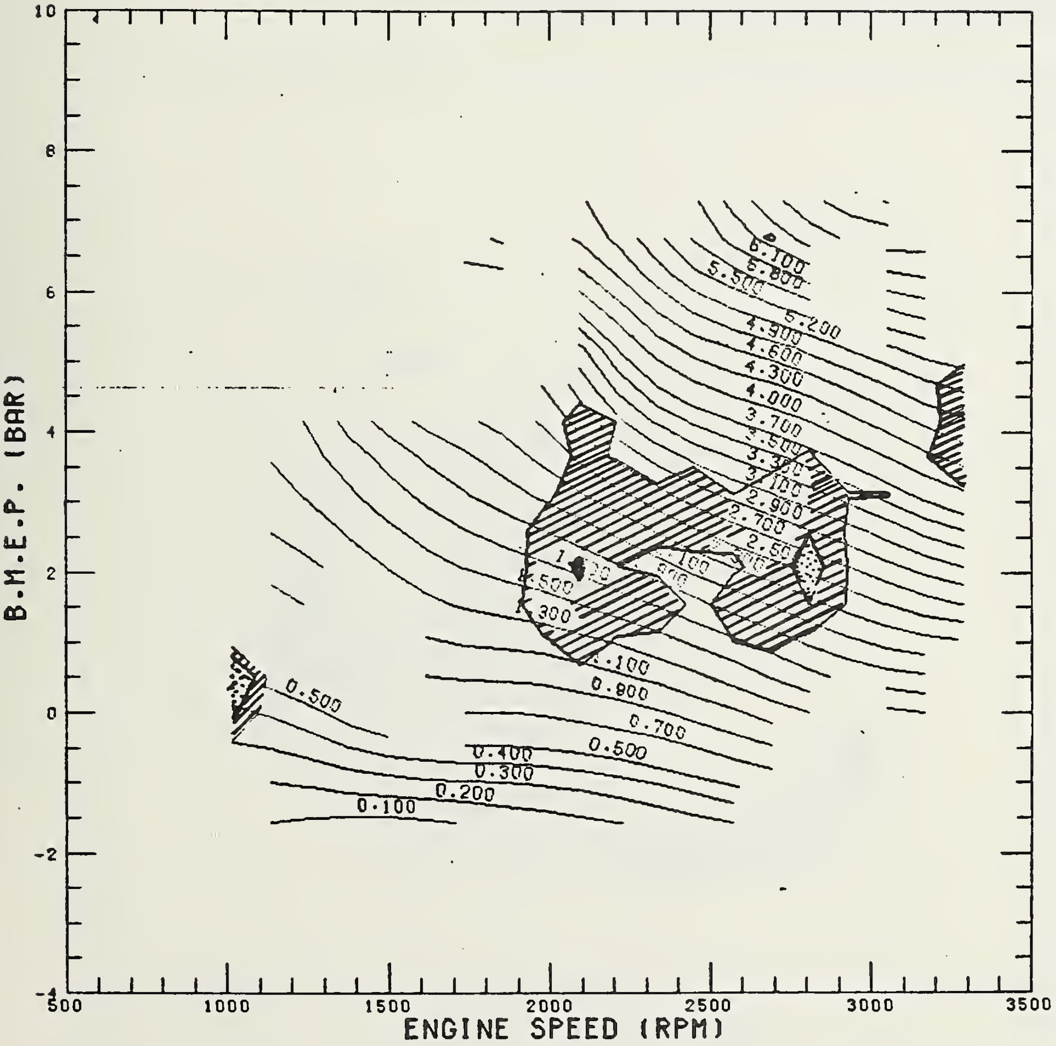

ROAD LOAD: FUEL NUMBER/FUEL DENSITY
323/0.841
15275/0.840
16086/0.825
16120/0.817
16140/0.834
16160/0.843
16164/0.869
FUEL ECONOMY (MPG)
0
20
40
60
80
100
CRUISE SPEED (MPH)
AIR TO FUEL RATIO
0
2
4
6
CRUISE SPEED (MPH)


ROAD LOAD: FUEL NUMBER/FUEL DENSITY
323/0.841
15275/0.840
16086/0.825
16120/0.817
16140/0.834
16160/0.843
16164/0.869
SMOKE VISIBILITY (BOSCH NUMBER)
0
1
2
3
4
5
0
20
40
60
80
100
CRUISE SPEED (MPH)
HC EMISSION (G/MI)
-.5
0
.5
1.0
1.5
0
20
40
60
80
100
CRUISE SPEED (MPH)


ROAD LOAD: FUEL NUMBER/FUEL DENSITY
323/0.841
15275/0.840
16066/0.825
16120/0.817
16140/0.834
16160/0.843
16164/0.869
CO EMISSION (G/MI)
3
2
1
0
-1
0
20
40
60
80
100
CRUISE SPEED (MPH)
NOX EMISSION (G/MI)
3
2
1
0
-1
0
20
40
60
80
100
CRUISE SPEED (MPH)

# 50 HP N.A. 90 CID
# FUEL CONSUMPTION (KG/H)

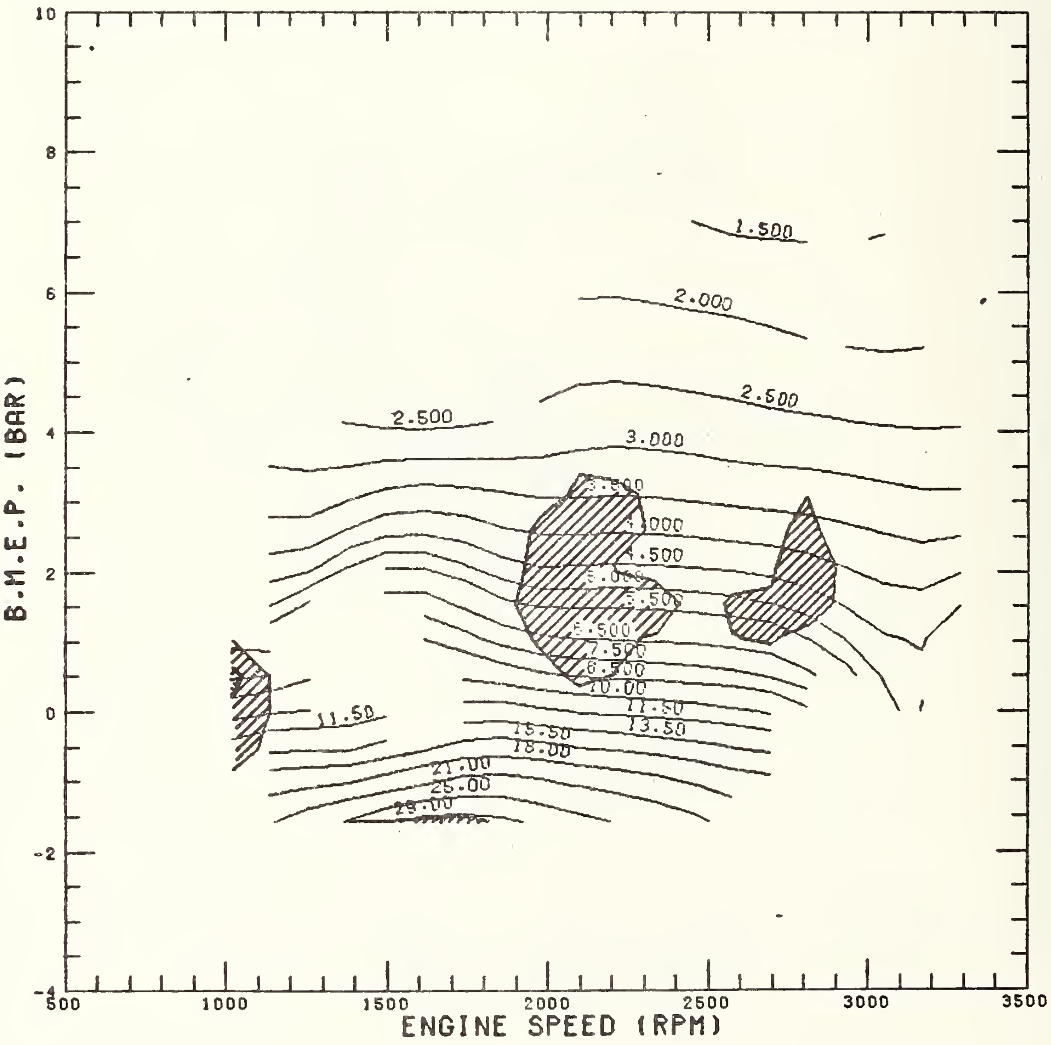
1372.0 SEC US-CITY TEST DATE 07/10/76 13.47.33
TEST RESULT 615.04 G/ 7.45 MI = 38.60 MPG
SHADED REGIONS 310.43 71.67 M
VEHICLE 1020 KG MASS. 0.80 SQM CW×F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



## 50 HP N.A. 90 CID

## AIR TO FUEL RATIO

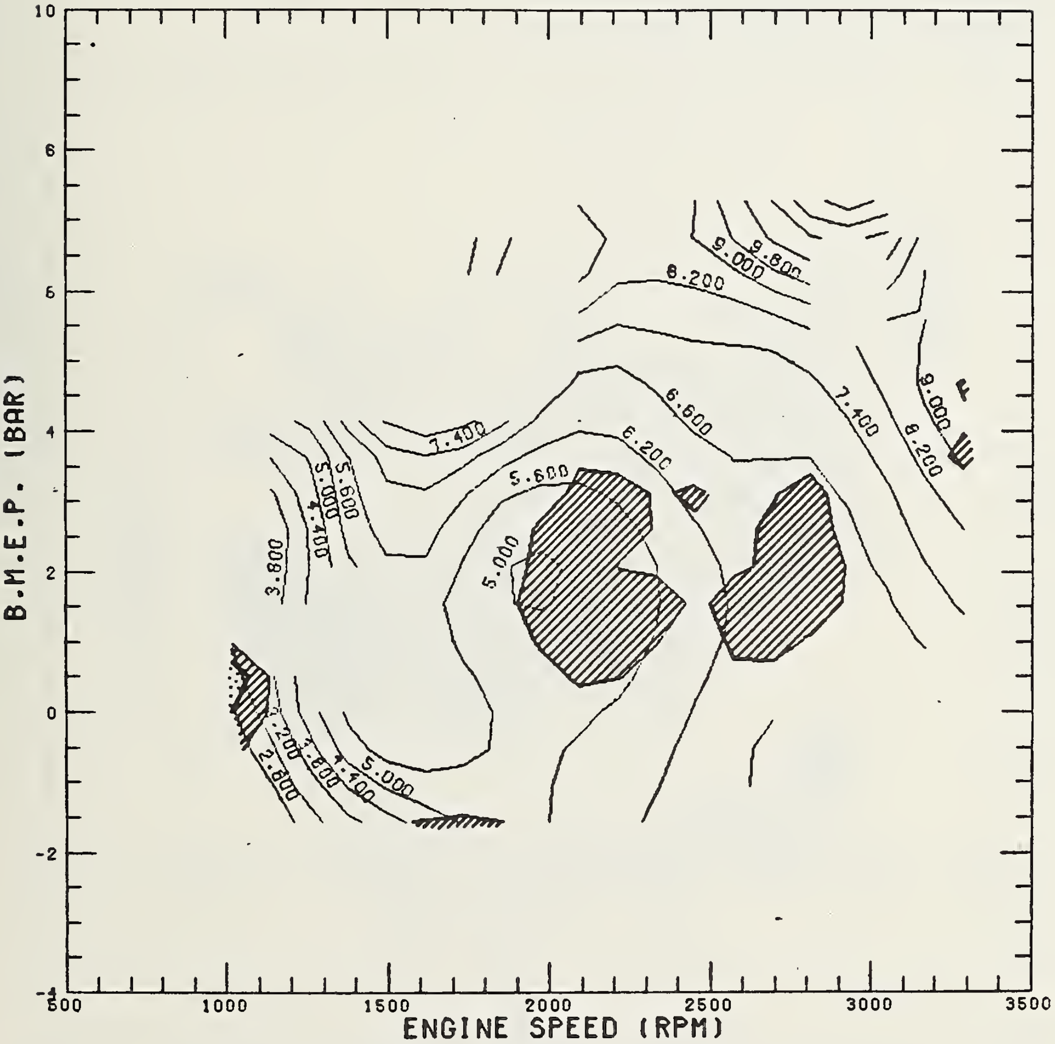
1372.0 SEC US-CITY TEST DATE 07/10/76 13.47.33
TEST RESULT 1372.25 S/ 7.45 MI = 19.54 MPH
SHADED REGIONS 682.87 194.37 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



50 HP N.A. 90 CID

HC - EMISSION (G/H)

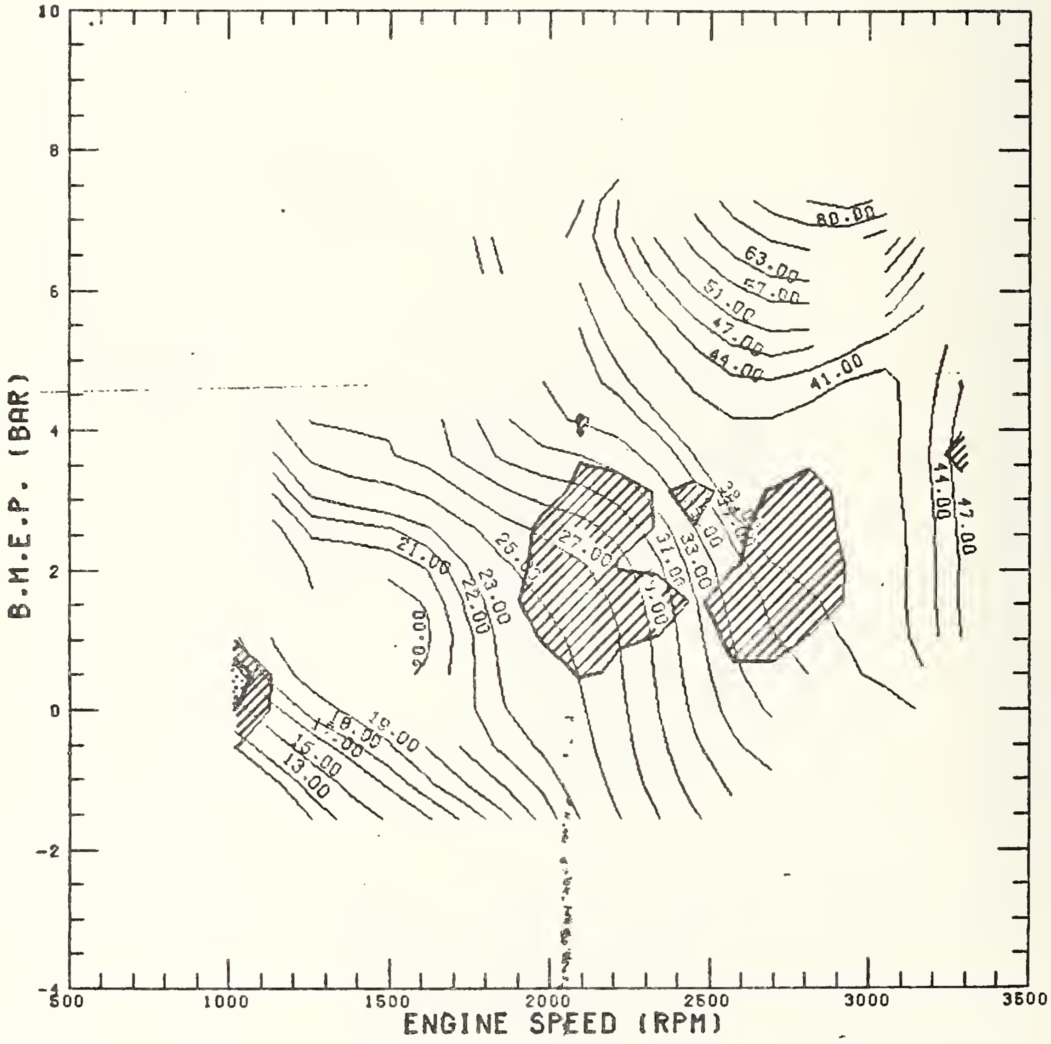
1372.0 SEC US-CITY TEST DATE 07/10/76 13.47.33
TEST RESULT 1.86 G/ 7.45 MI = 0.25 G/MI
SHADED REGIONS 0.94 0.14 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



## 50 HP N.A. 90 CID

## CO - EMISSION (G/H)

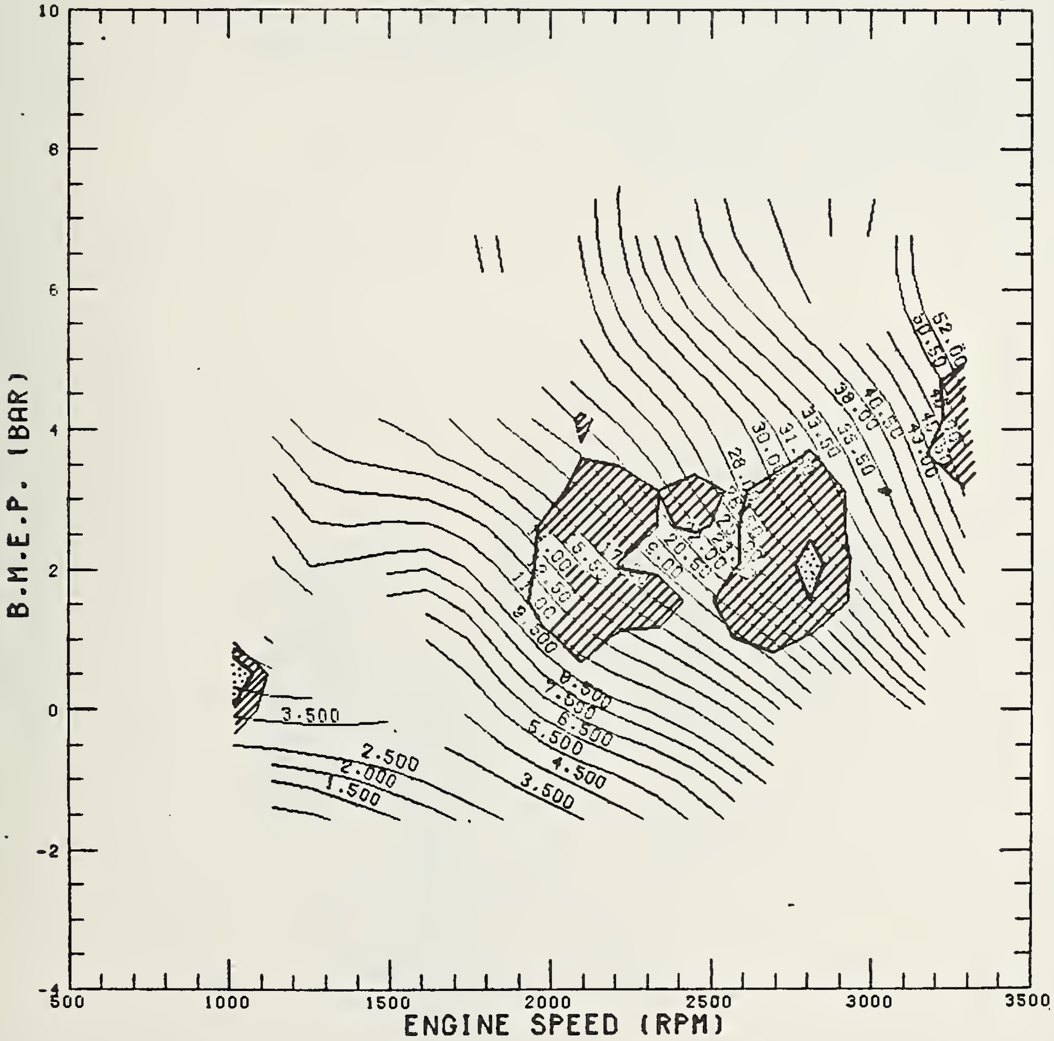
1372.0 SEC  US-CITY  TEST DATE 07/10/76  13.47.33
TEST RESULT 9.77 G/ 7.45 MI = 1.31 G/MI
SHADED REGIONS  4.84 1.30 G
VEHICLE  1020 KG MASS.  0.80 SQM CW*F.  1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



# 50 HP N.A. 90 CID

# NOX - EMISSION (G/H)

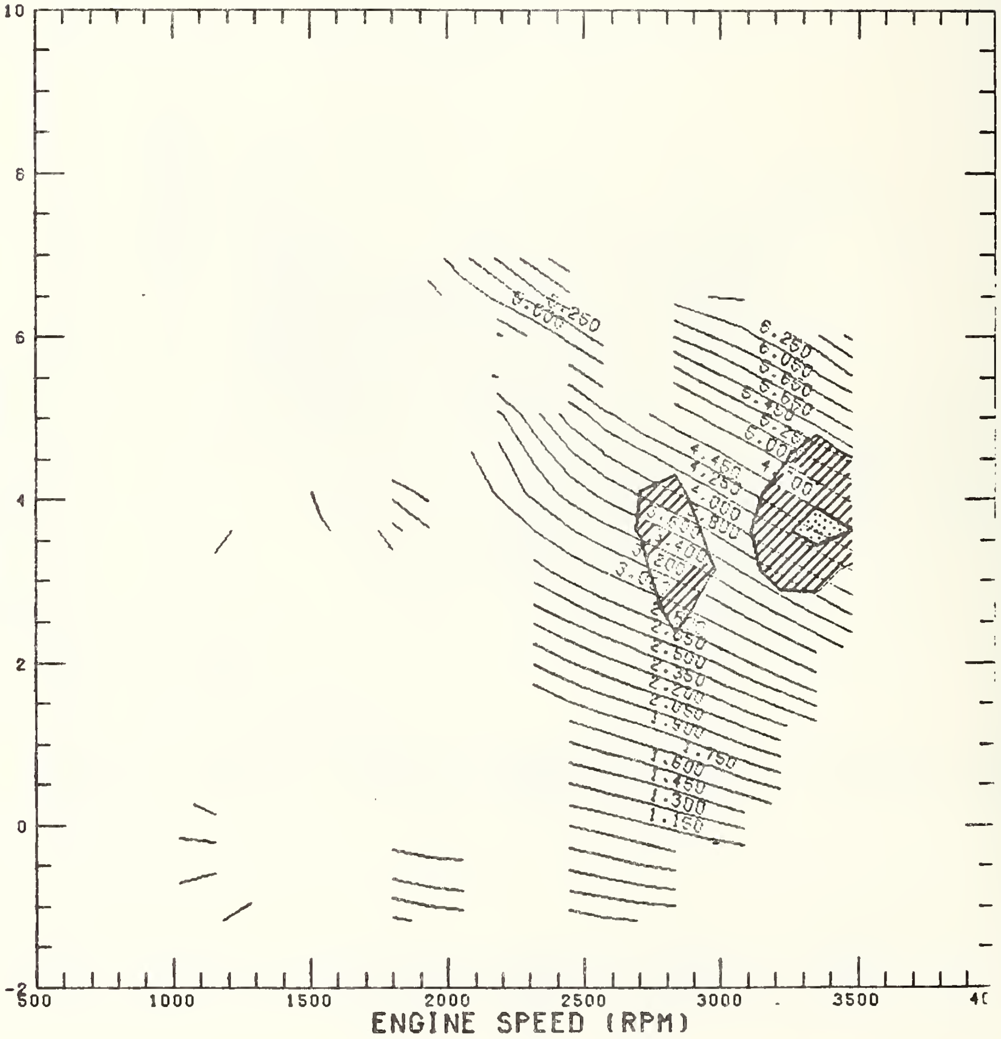
1372.0 SEC US-CITY TEST DATE 07/10/76 13.47.33
TEST RESULT 5.58 G/ 7.45 MI = 0.75 G/MI
SHADED REGIONS 2.82 0.60 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



# 50 HP N.A. 90 CID

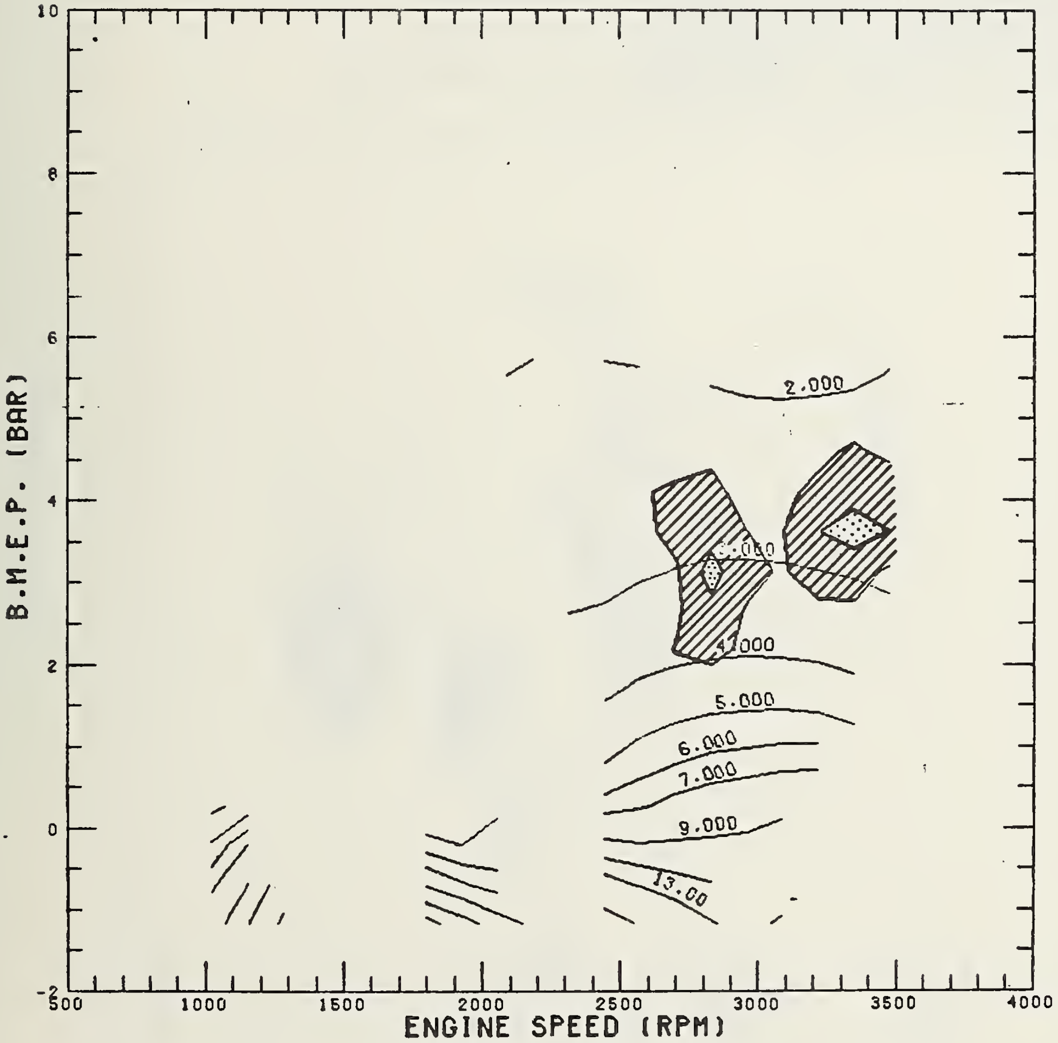
# FUEL CONSUMPTION (KG/H)

764.0 SEC  HIGHWAY  TEST DATE 07/10/76  14.30.52
TEST RESULT 772.33 G/ 10.25 MI = 42.30 MPG
SHADED REGIONS  397.16 83.86 M
VEHICLE  1020 KG MASS.  0.80 SQM CW*F.  1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



# 50 HP N.A. 90 CID
# AIR TO FUEL RATIO

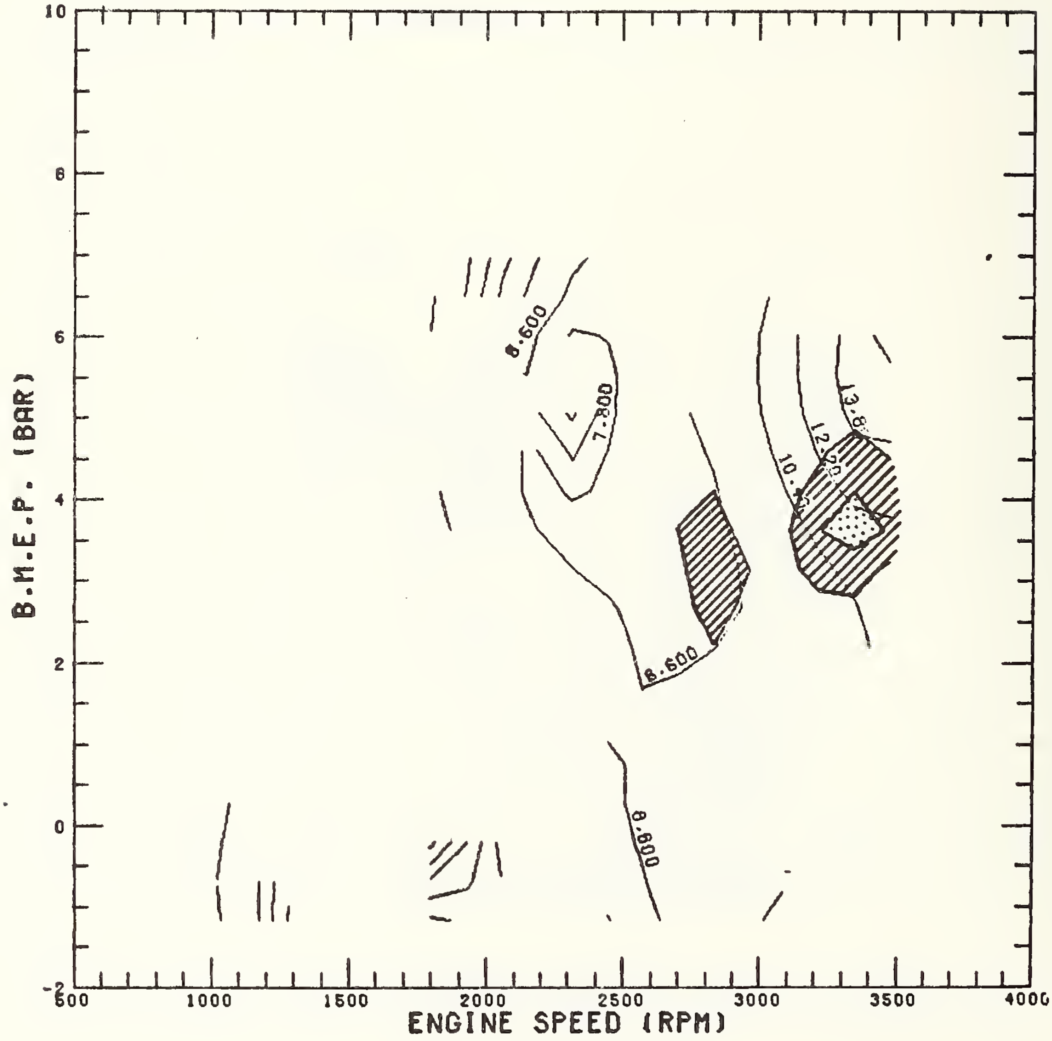
764.0 SEC HIGHWAY TEST DATE 07/10/76 14.30.52
TEST RESULT 764.25 S/ 10.25 MI = 48.28 MPH
SHADED REGIONS 386.25 73.62 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



# 50 HP N.A. 90 CID

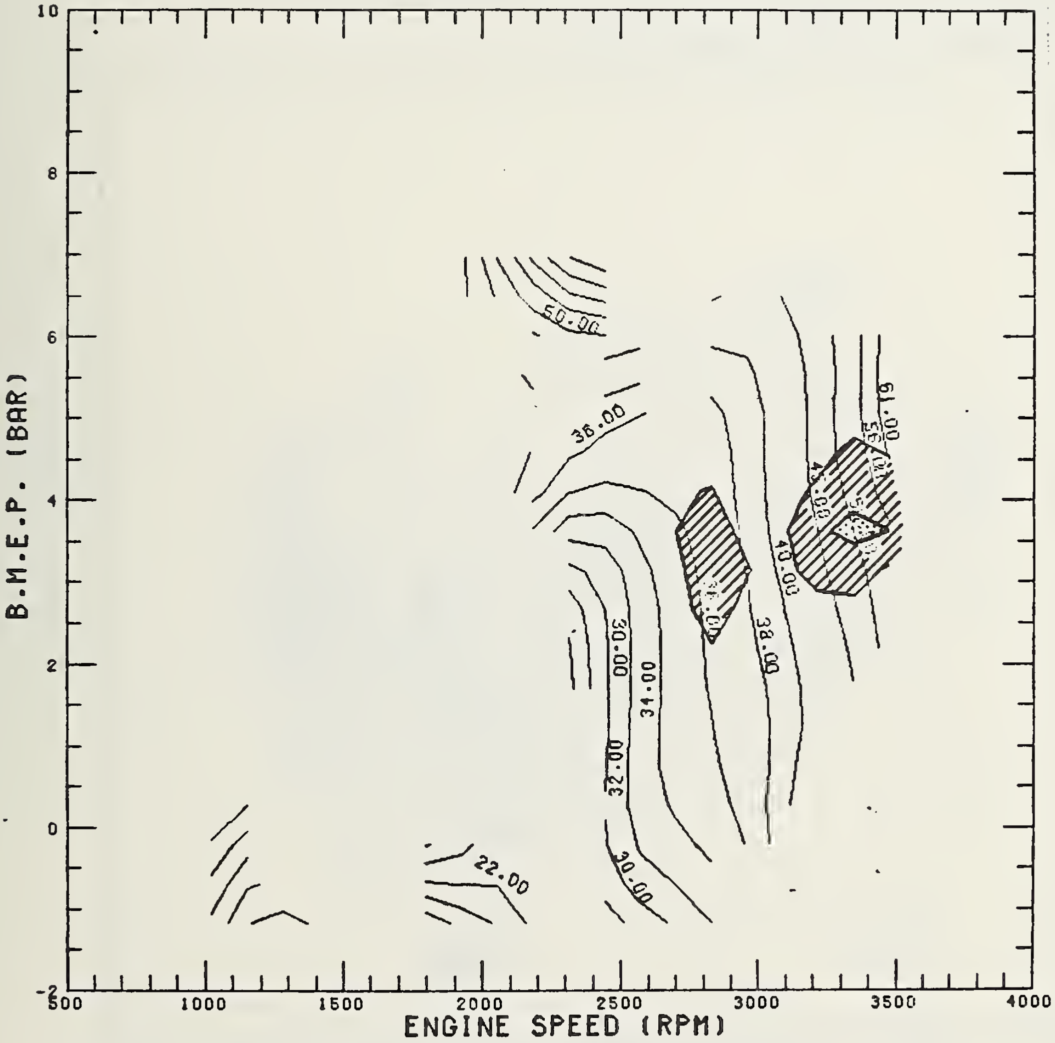
# HC - EMISSION (G/H)

764.0 SEC HIGHWAY TEST DATE 07/10/76 14.30.52
TEST RESULT 1.96 G/ 10.25 MI = 0.19 G/MI
SHADED REGIONS 0.99 0.21 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



# 50 HP N.A. 90 CID
# CO - EMISSION (G/H)

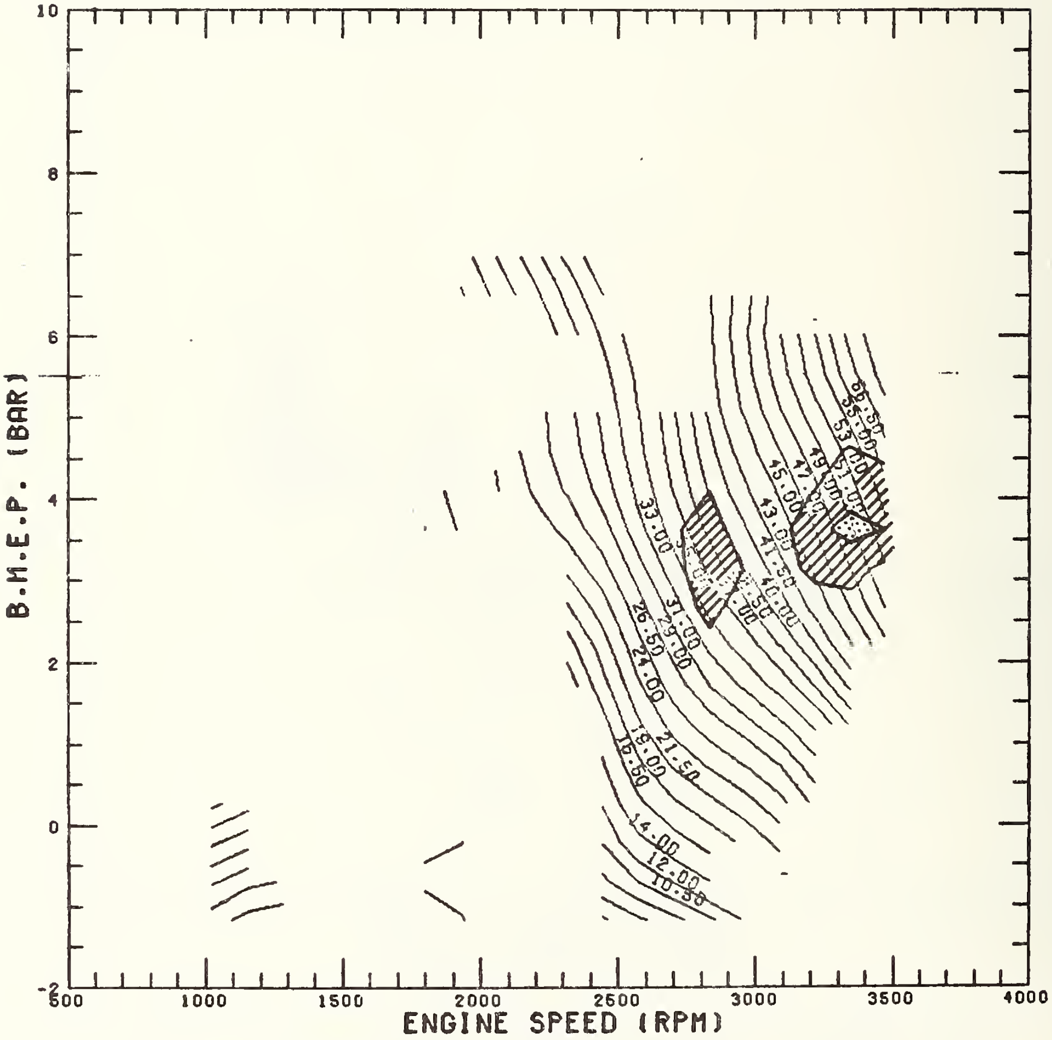
764.0 SEC HIGHWAY TEST DATE 07/10/76 14.30.52
TEST RESULT 8.22 G/ 10.25 MI = 0.80 G/MI
SHADED REGIONS 4.02 0.93 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



## 50 HP N.A. 90 CID

## NOX - EMISSION (G/H)

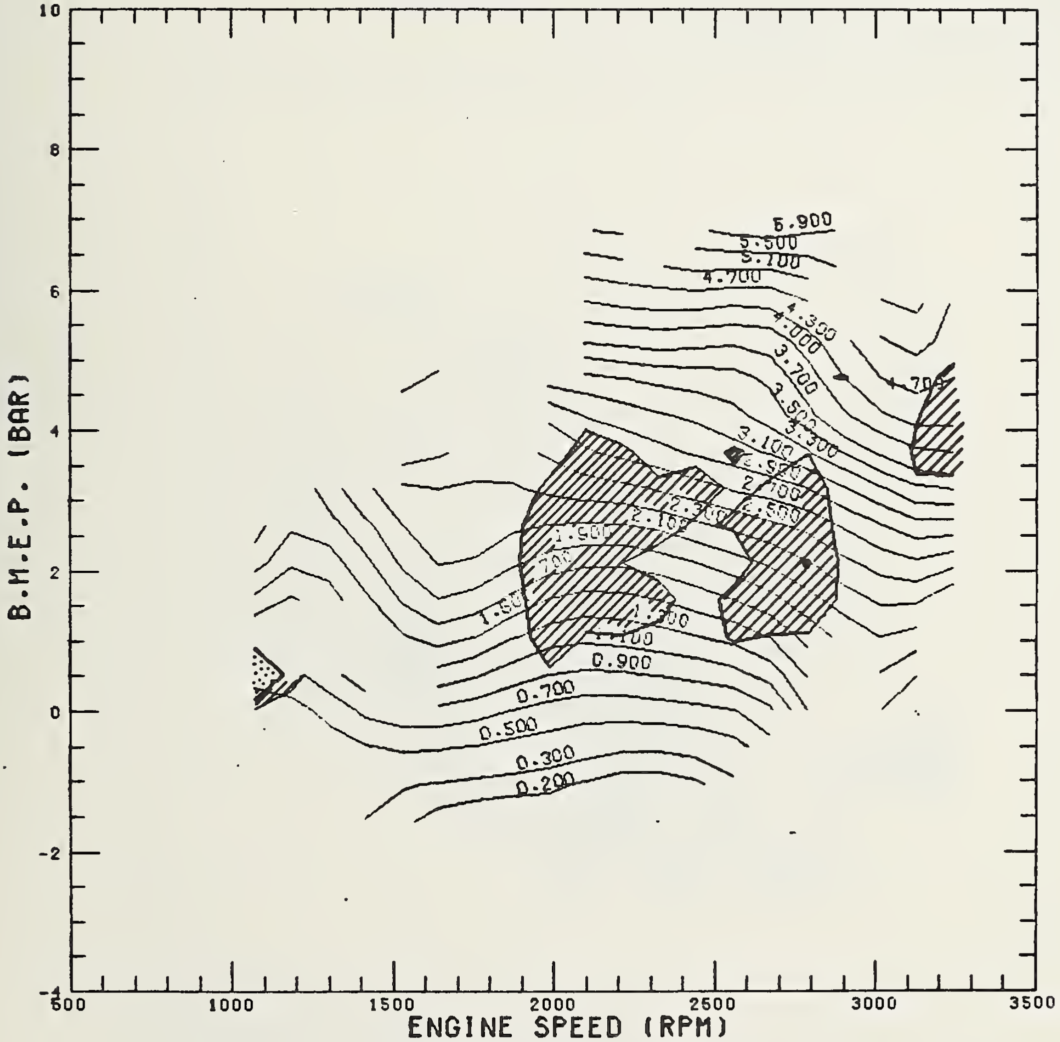
764.0 SEC HIGHWAY TEST DATE 07/10/76 14.30.52
TEST RESULT 7.97 G/ 10.25 MI = 0.78 G/MI
SHADED REGIONS 3.99 0.52 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



## 50 HP N.A. E.G.R.

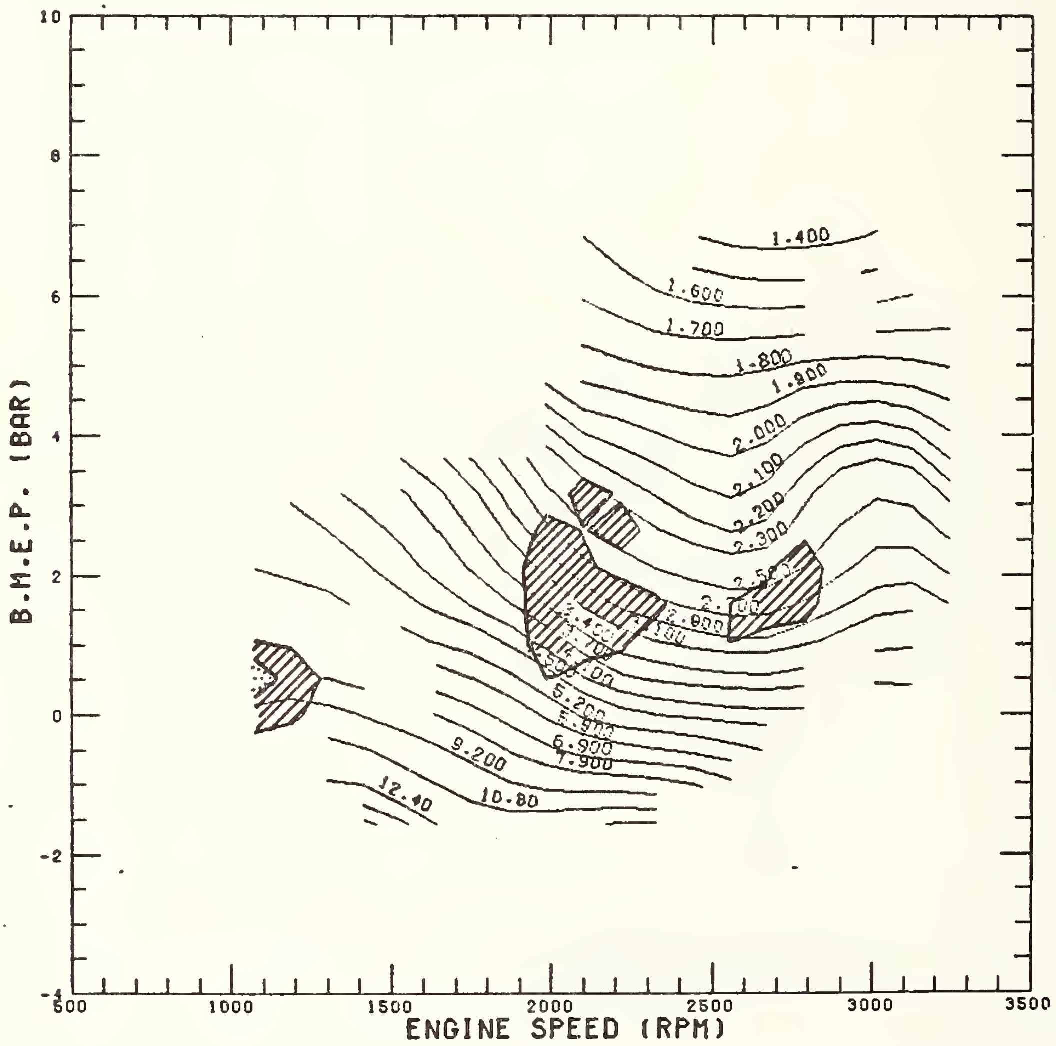
## FUEL CONSUMPTION (KG/H)

1372.0 SEC US-CITY TEST DATE 11/08/77 14.21.28
TEST RESULT 562.51 G/ 7.45 MI = 41.45 MPG
SHADED REGIONS 282.20 47.57 M
VEHICLE 1020 KG MASS. 0.80 SQM CH*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



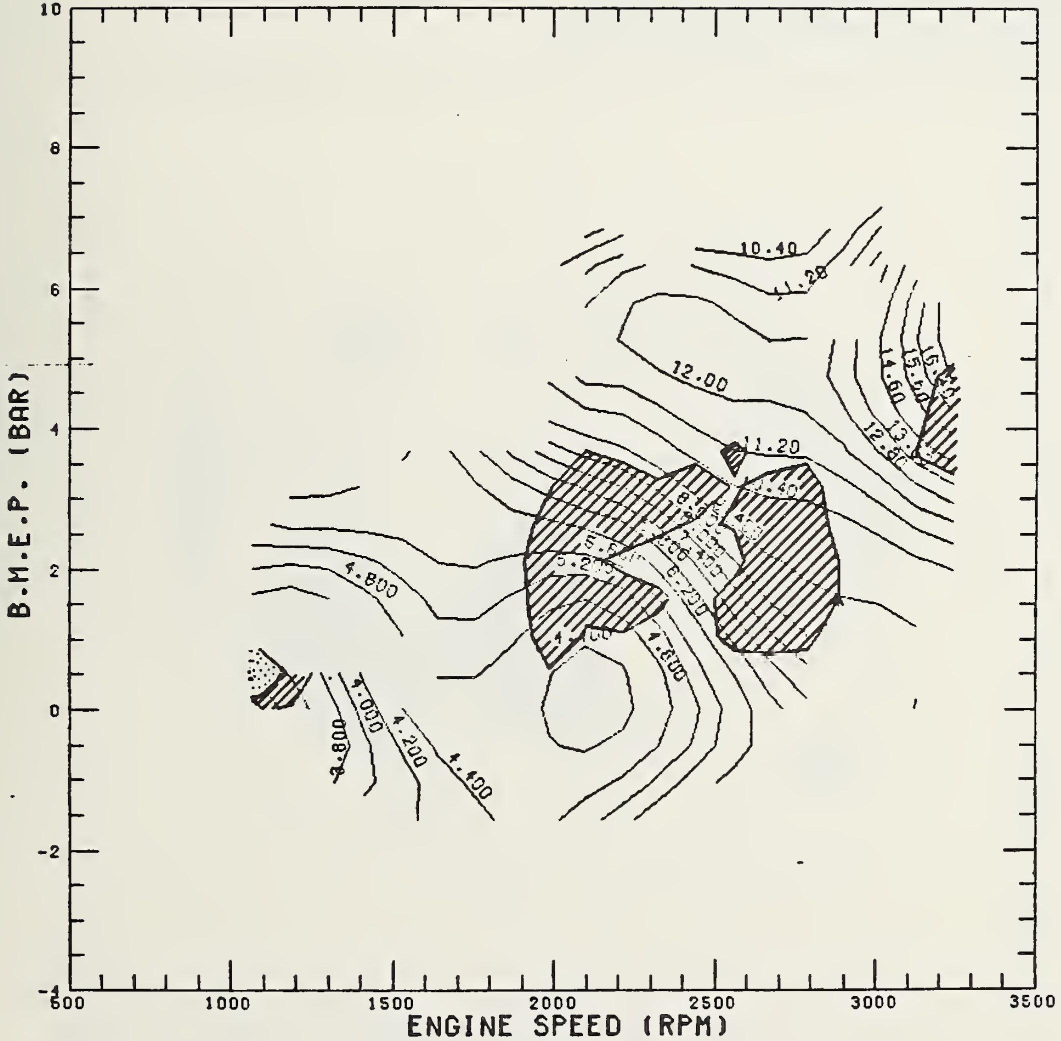
## 50 HP N.A. E.G.R.
## AIR TO FUEL RATIO

1372.0 SEC US-CITY TEST DATE 11/08/77 14.21.28
TEST RESULT 1372.25 S/ 7.45 MI = 19.54 MPH
SHADED REGIONS 678.62 276.00 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3

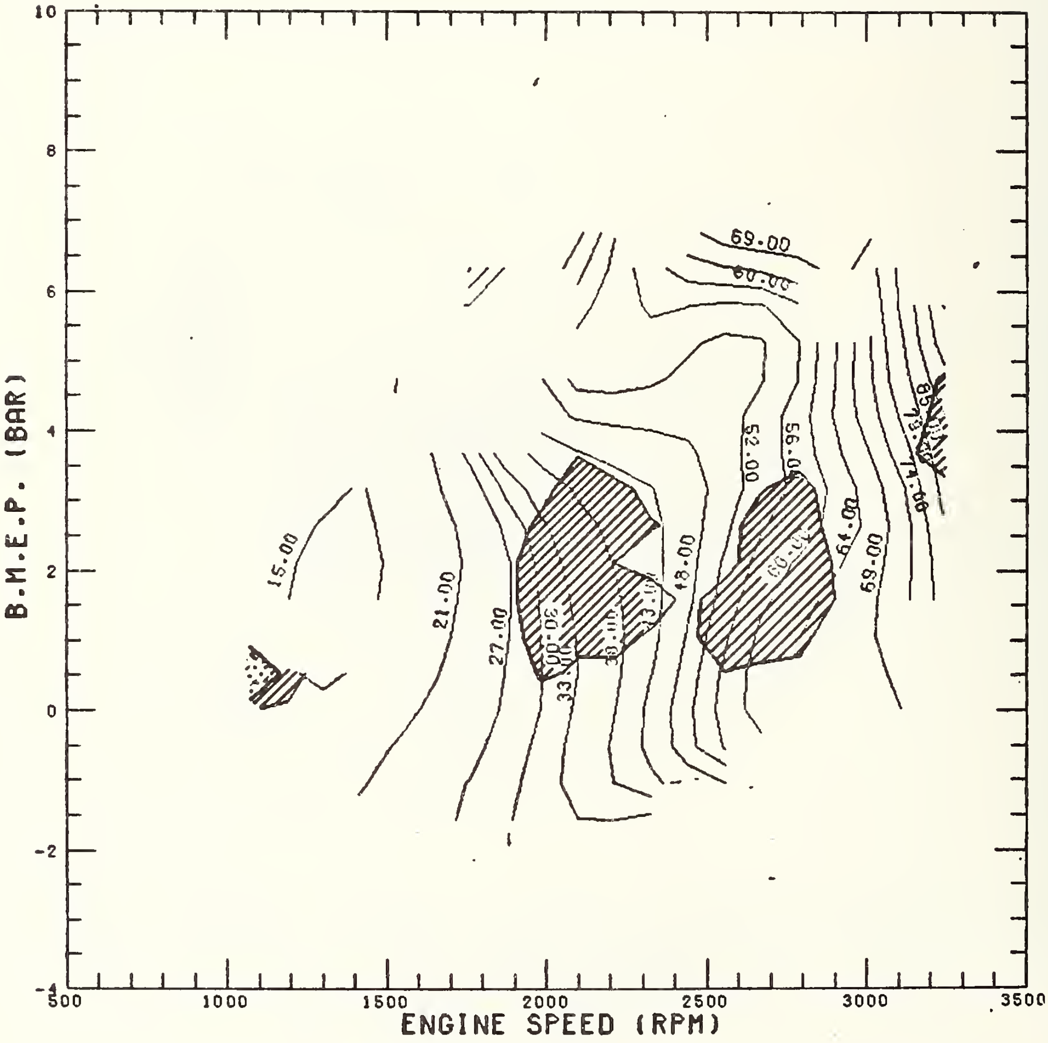


## 50 HP N.A. E.G.R.
## HC – EMISSION (G/H)

1372.0 SEC  US-CITY  TEST DATE 11/08/77  14.21.28
TEST RESULT 2.29 G/ 7.45 MI = 0.31 G/MI
SHADED REGIONS  1.15 0.22 G
VEHICLE  1020 KG MASS.  0.80 SQM CW*F.  1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3

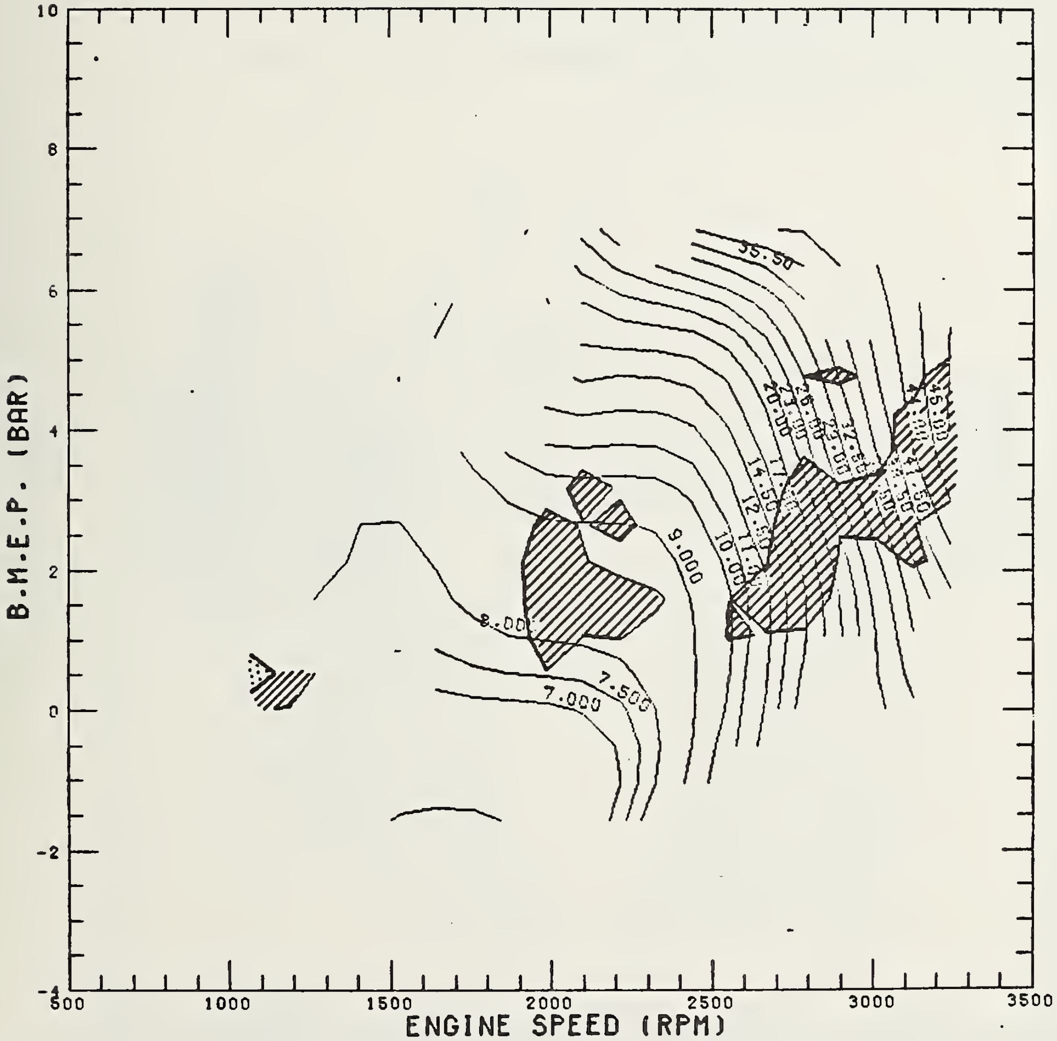


50 HP N.A. E.G.R.
CO - EMISSION (G/H)
1372.0 SEC US-CITY TEST DATE 11/08/77 14.21.28
TEST RESULT 13.76 G/ 7.45 MI = 1.85 G/MI
SHADED REGIONS 6.91 1.19 G
VEHICLE 1020 KG MASS, 0.80 SQM CW*F, 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



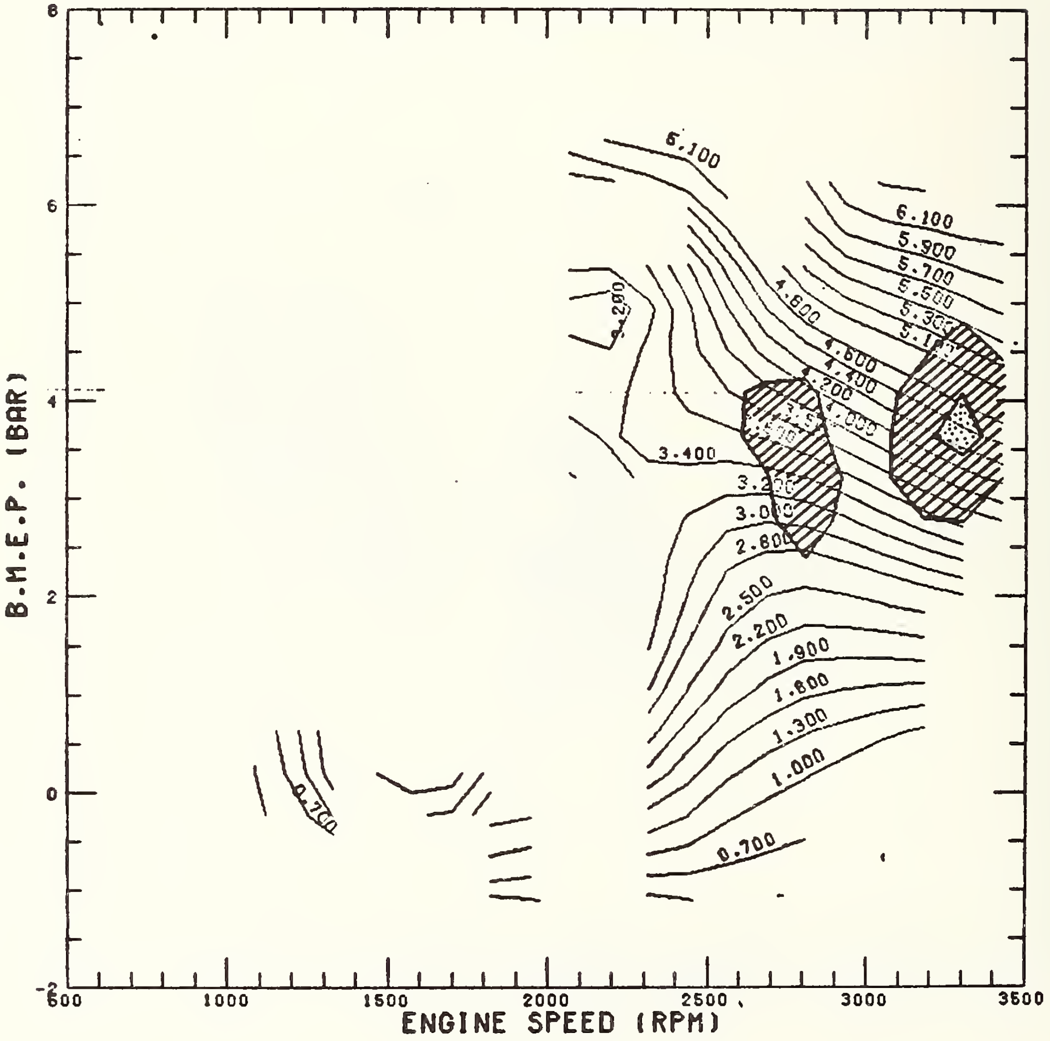
# 50 HP N.A. E.G.R.
# NOX - EMISSION (G/H)

1372.0 SEC US-CITY TEST DATE 11/08/77 14.21.28
TEST RESULT 4.15 G/ 7.45 MI = 0.56 G/MI
SHADED REGIONS 2.06 0.50 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



## 50 HP N.A. E.G.R.
## FUEL CONSUMPTION (KG/H)

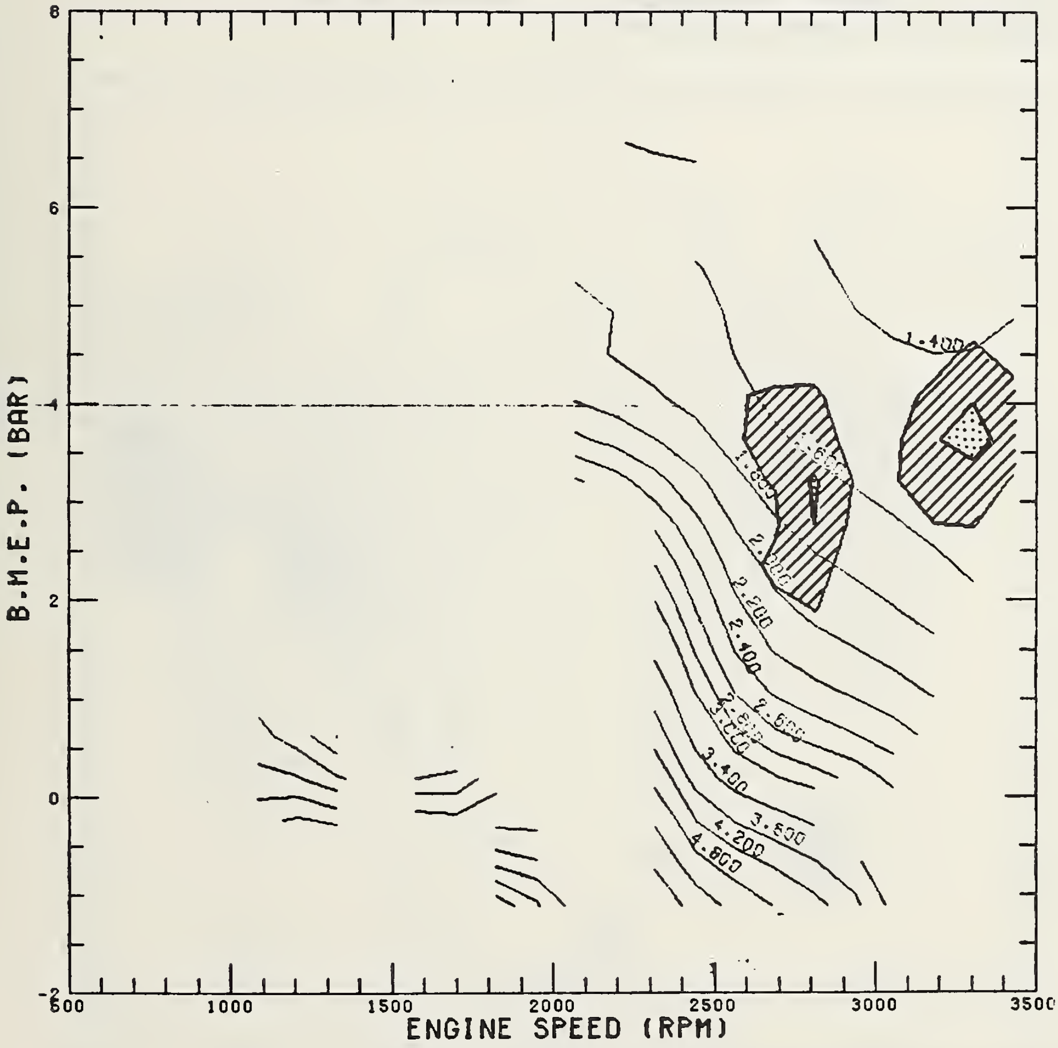
764.0 SEC HIGHWAY TEST DATE 11/08/77 14.50.33
TEST RESULT 765.71 G/ 10.25 MI = 41.90 MPG
SHADED REGIONS 384.92 50.38 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



# 50 HP N.A. E.G.R.
# AIR TO FUEL RATIO

764.0 SEC HIGHWAY TEST DATE 11/08/77 14.50.33
TEST RESULT 764.25 S/ 10.25 MI = 48.28 MPH
SHADED REGIONS 384.62 99.37 M

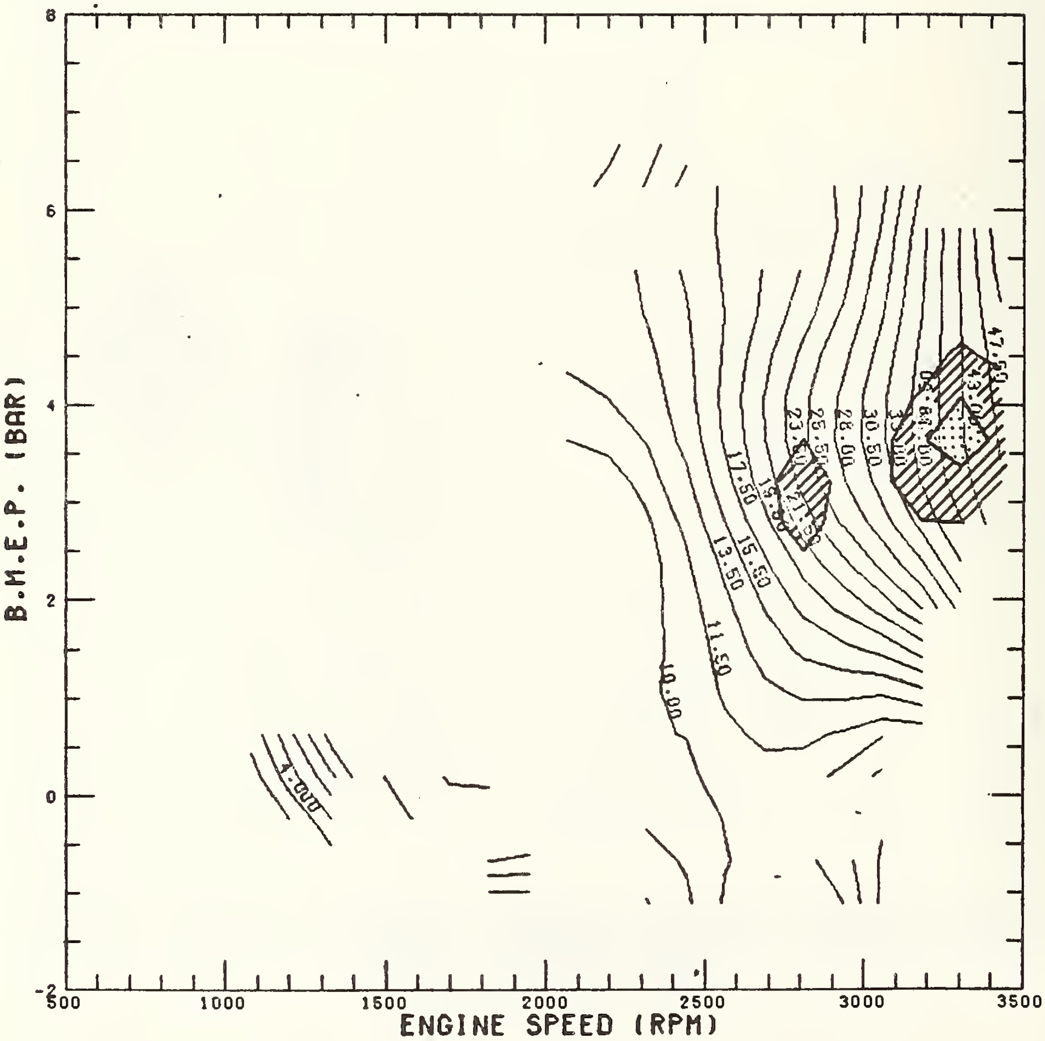
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



## 50 HP N.A. E.G.R.

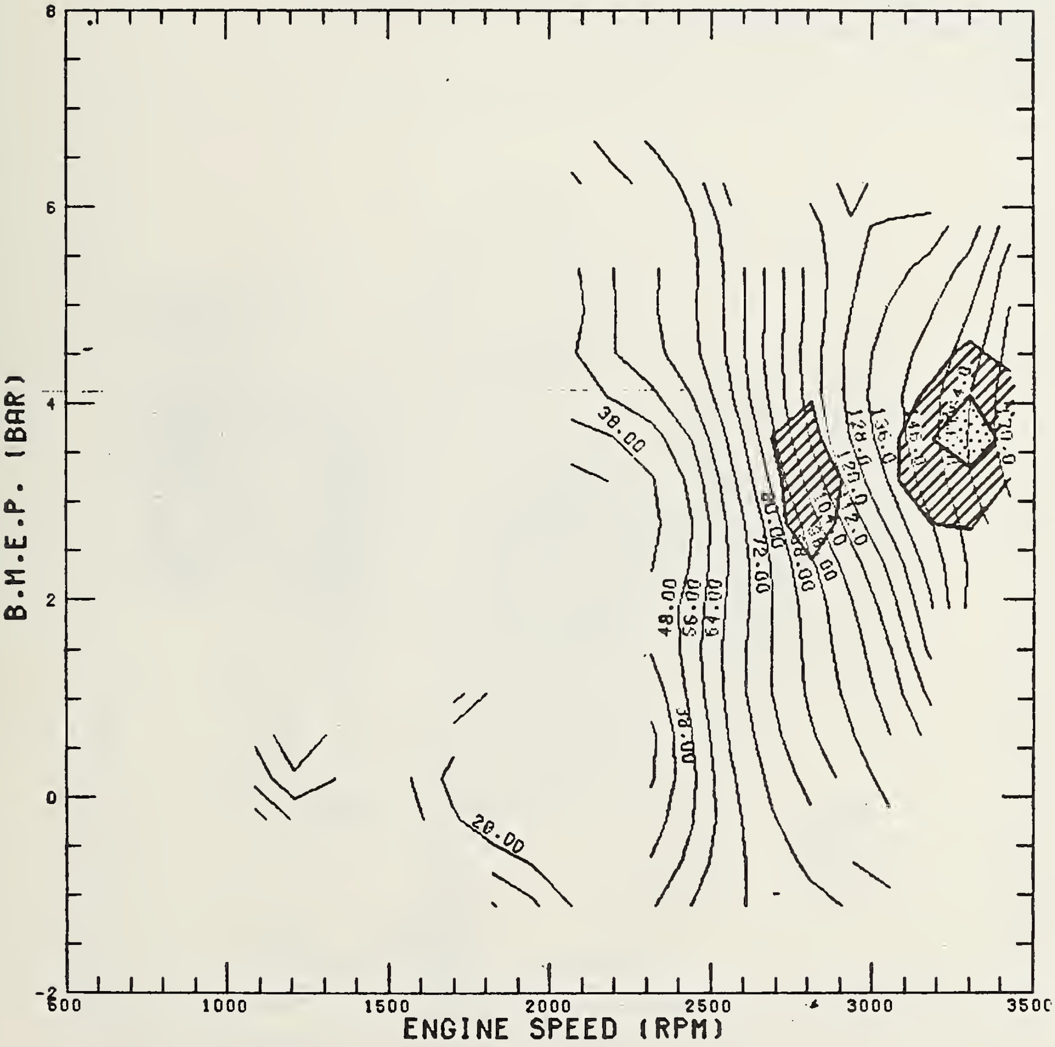
## HC - EMISSION (G/H)

764.0 SEC HIGHWAY TEST DATE 11/08/77 14.50.33
TEST RESULT 5.86 G/ 10.25 MI = 0.57 G/MI
SHADED REGIONS 2.84 0.49 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



# 50 HP N.A. E.G.R.
# CO - EMISSION (G/H)

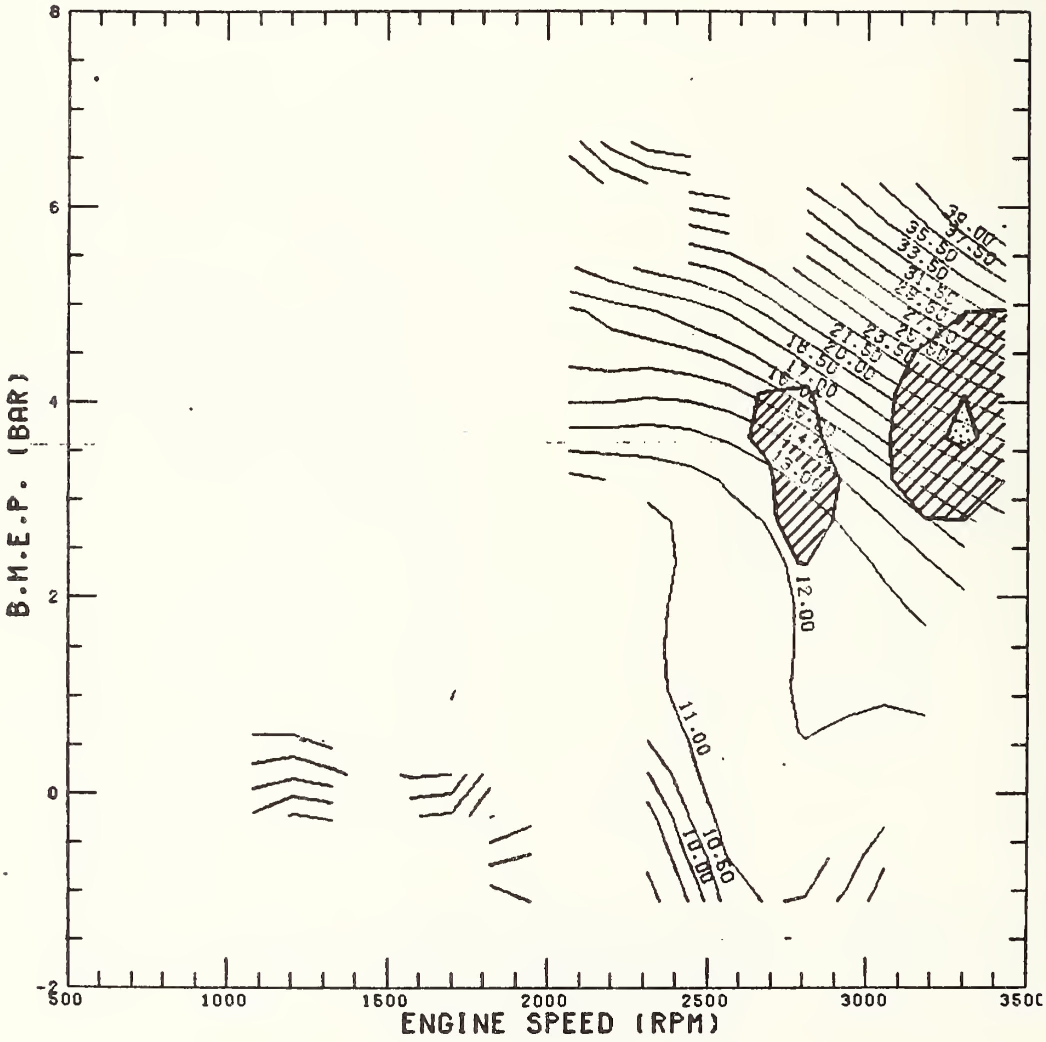
764.0 SEC HIGHWAY TEST DATE 11/08/77 14.50.33
TEST RESULT 25.24 G/ 10.25 MI = 2.46 G/MI
SHADED REGIONS 12.52 1.89 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



## 50 HP N.A. E.G.R.

## NOX - EMISSION (G/H)

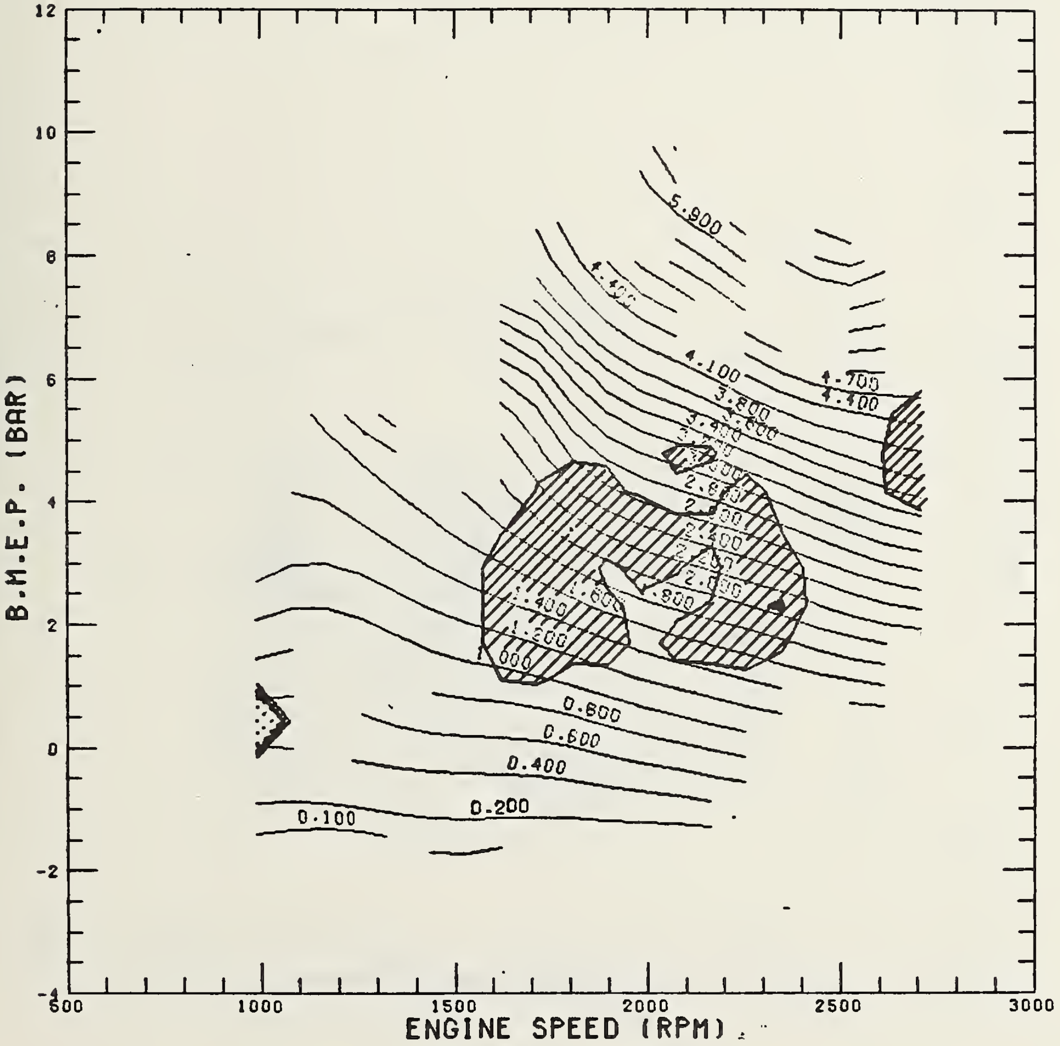
764.0 SEC HIGHWAY TEST DATE 11/08/77 14.50.33
TEST RESULT 3.53 G/ 10.25 MI = 0.34 G/MI
SHADED REGIONS 1.76 0.39 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 3



# 70 HP TC 90 CID

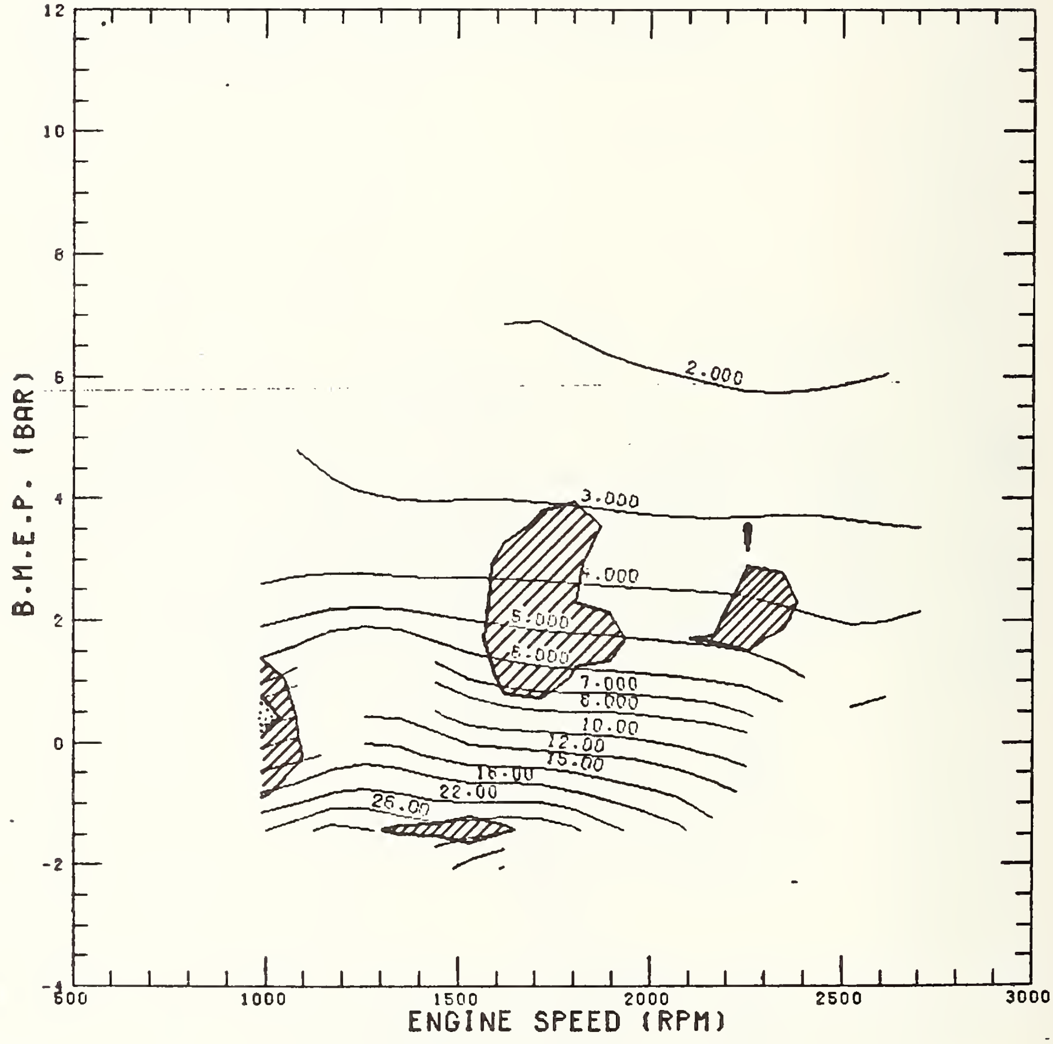
# FUEL CONSUMPTION (KG/H)

1372.0 SEC US-CITY TEST DATE 10/11/76 11.34.59
TEST RESULT 529.61 G/ 7.45 MI = 43.92 MPG
SHADED REGIONS 267.07 60.38 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC 90 CID
# AIR TO FUEL RATIO

1372.0 SEC  US-CITY  TEST DATE 10/11/76  11.34.59
TEST RESULT 1372.25 S/ 7.45 MI = 19.54 MPH
SHADED REGIONS  679.50 281.75 M
VEHICLE  1020 KG MASS.  0.60 SQM CW*F.  1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC 90 CID

# HC - EMISSION (G/H)

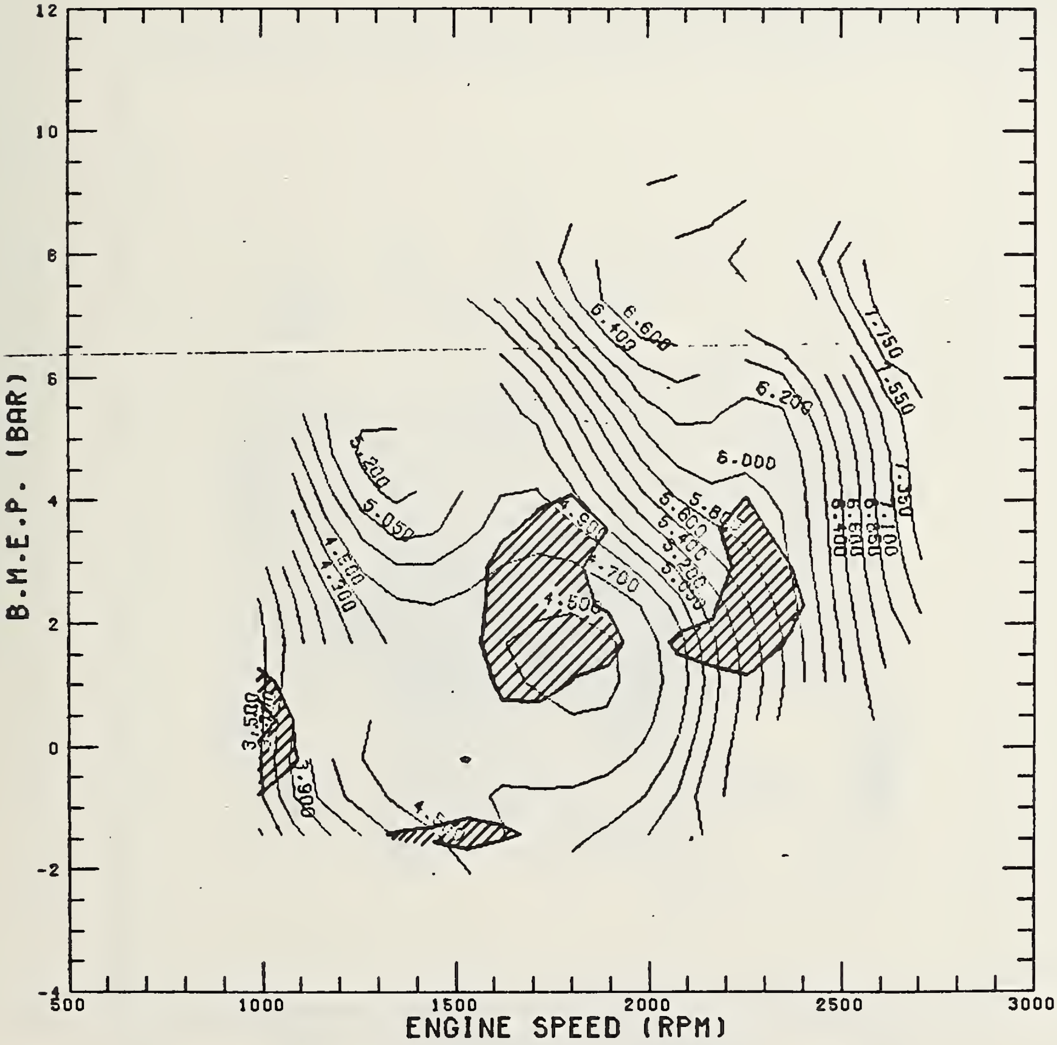
1372.0 SEC US-CITY TEST DATE 10/11/76 11.34.59

TEST RESULT 1.70 G/ 7.45 MI = 0.23 G/MI

SHADED REGIONS 0.84 0.28 G

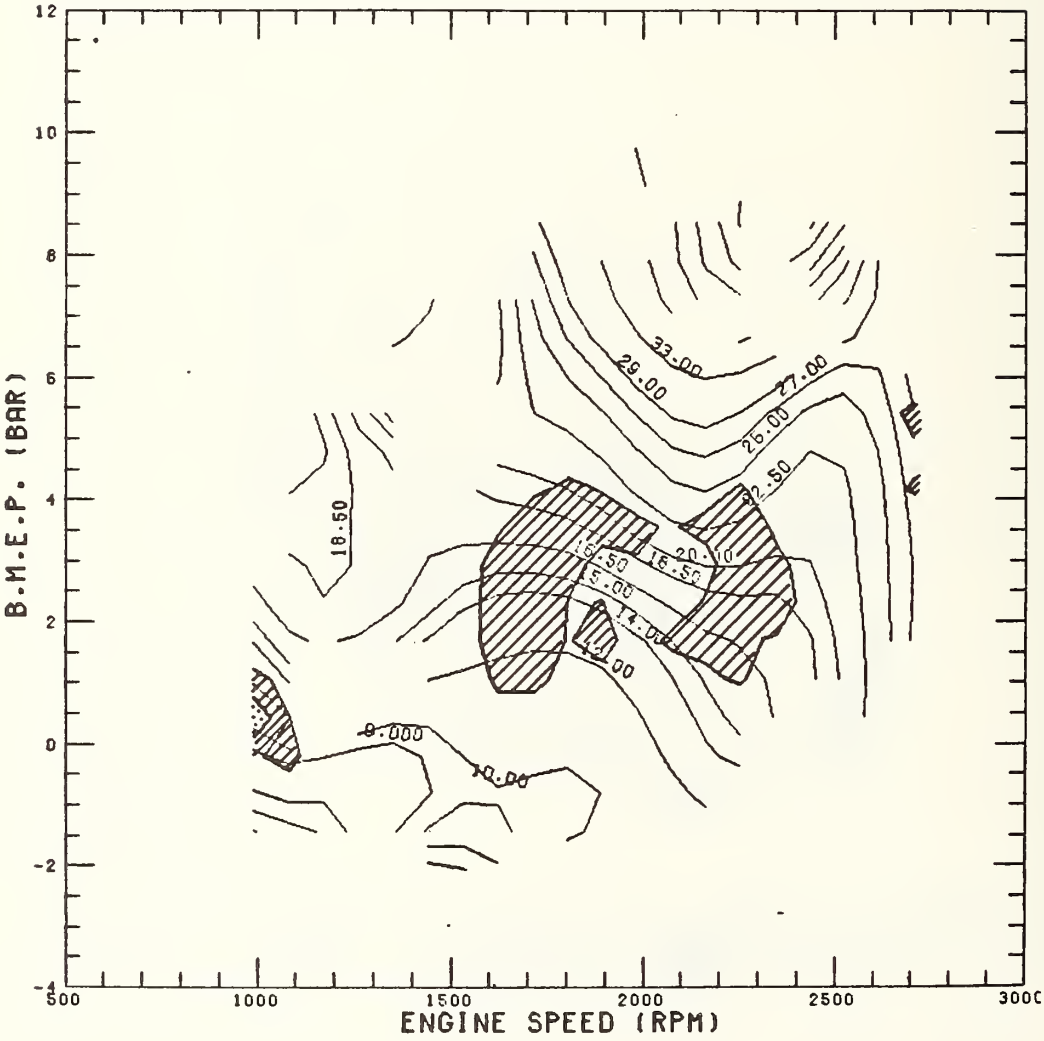
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG

TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC 90 CID
# CO - EMISSION (G/H)

1372.0 SEC US-CITY TEST DATE 10/11/76. 11.34.59
TEST RESULT 5.39 G/ 7.45 MI = 0.72 G/MI
SHADED REGIONS 2.68 0.93 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



70 HP TC 90 CID

NOX - EMISSION (G/H)

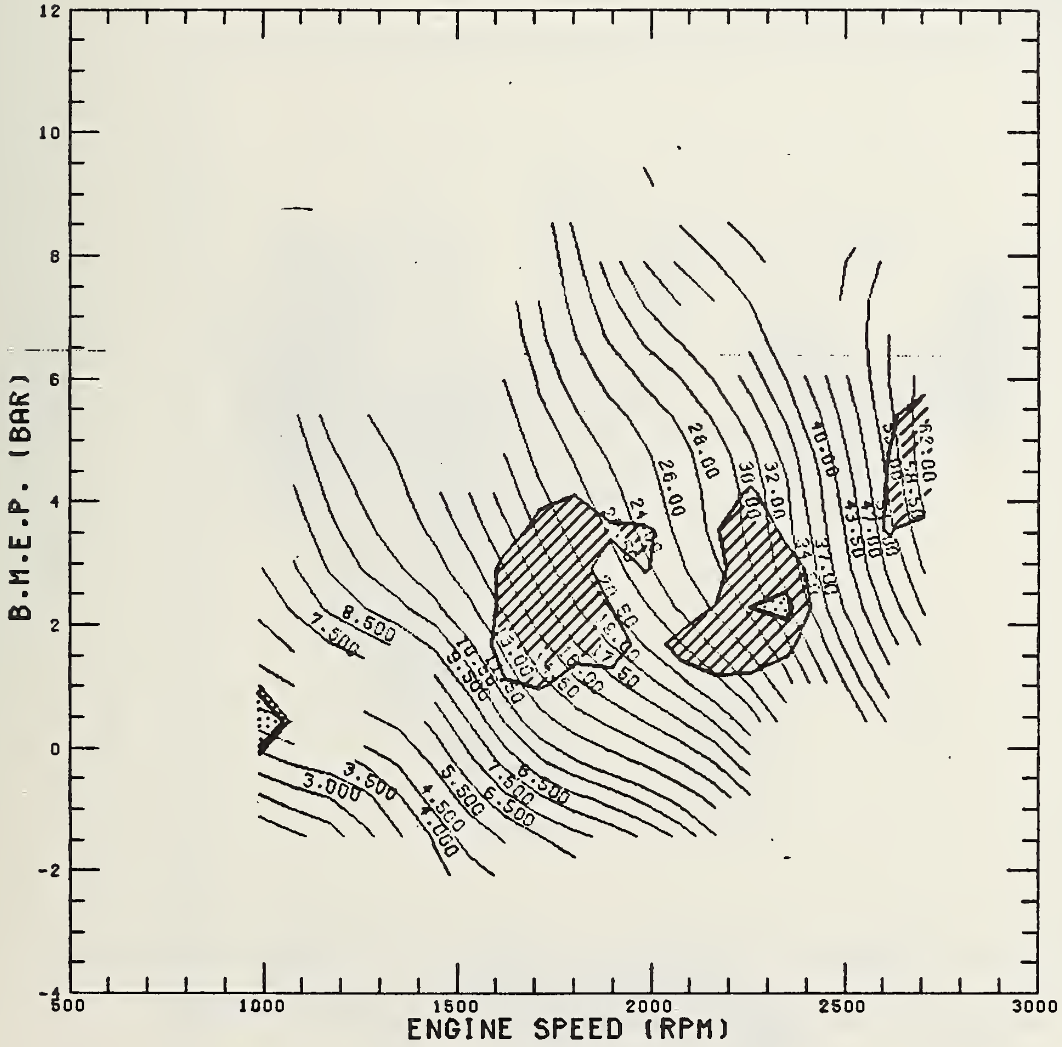
1372.0 SEC US-CITY TEST DATE 10/11/76 11.34.59

TEST RESULT 6.00 G/ 7.45 MI = 0.80 G/MI

SHADED REGIONS 2.96 0.61 G

VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG

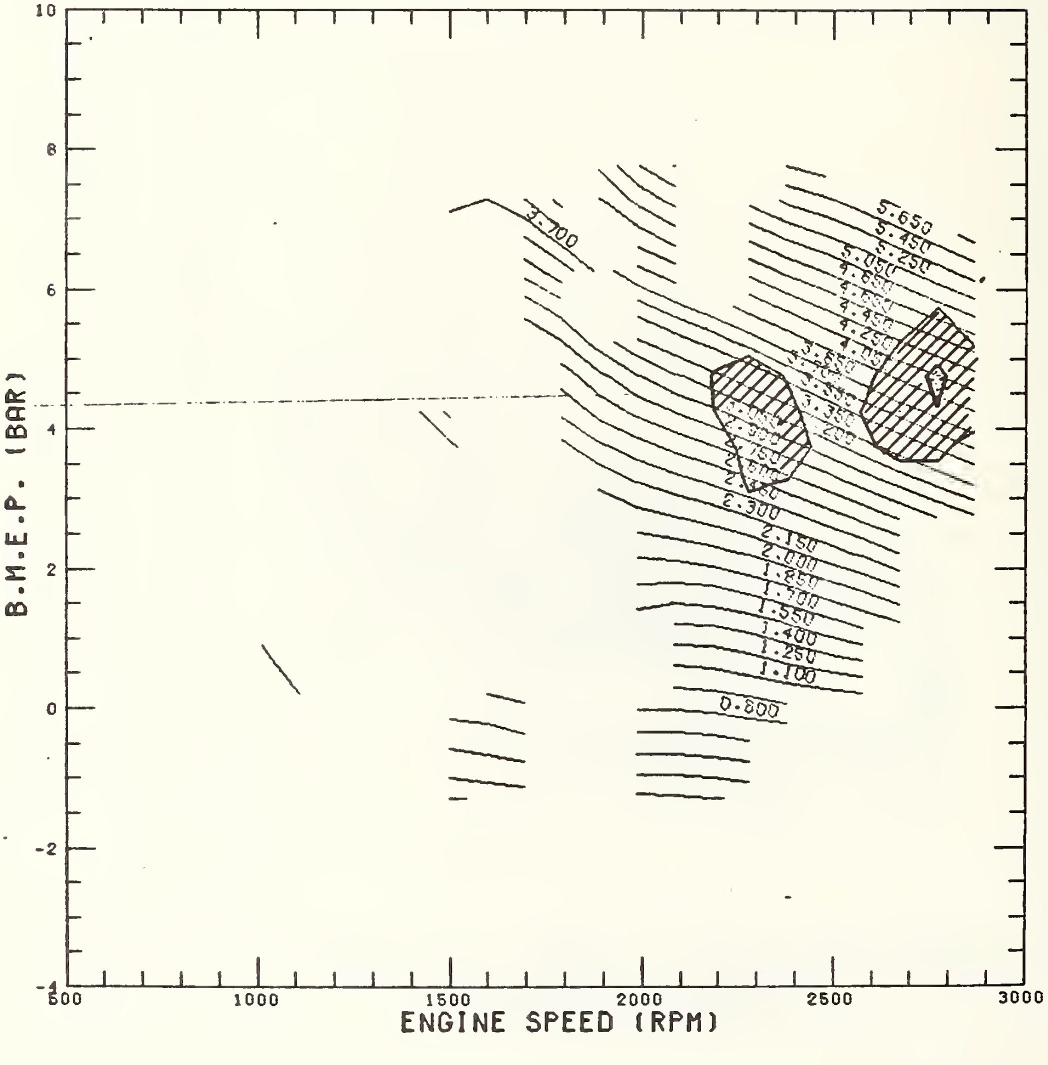
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC 90 CID

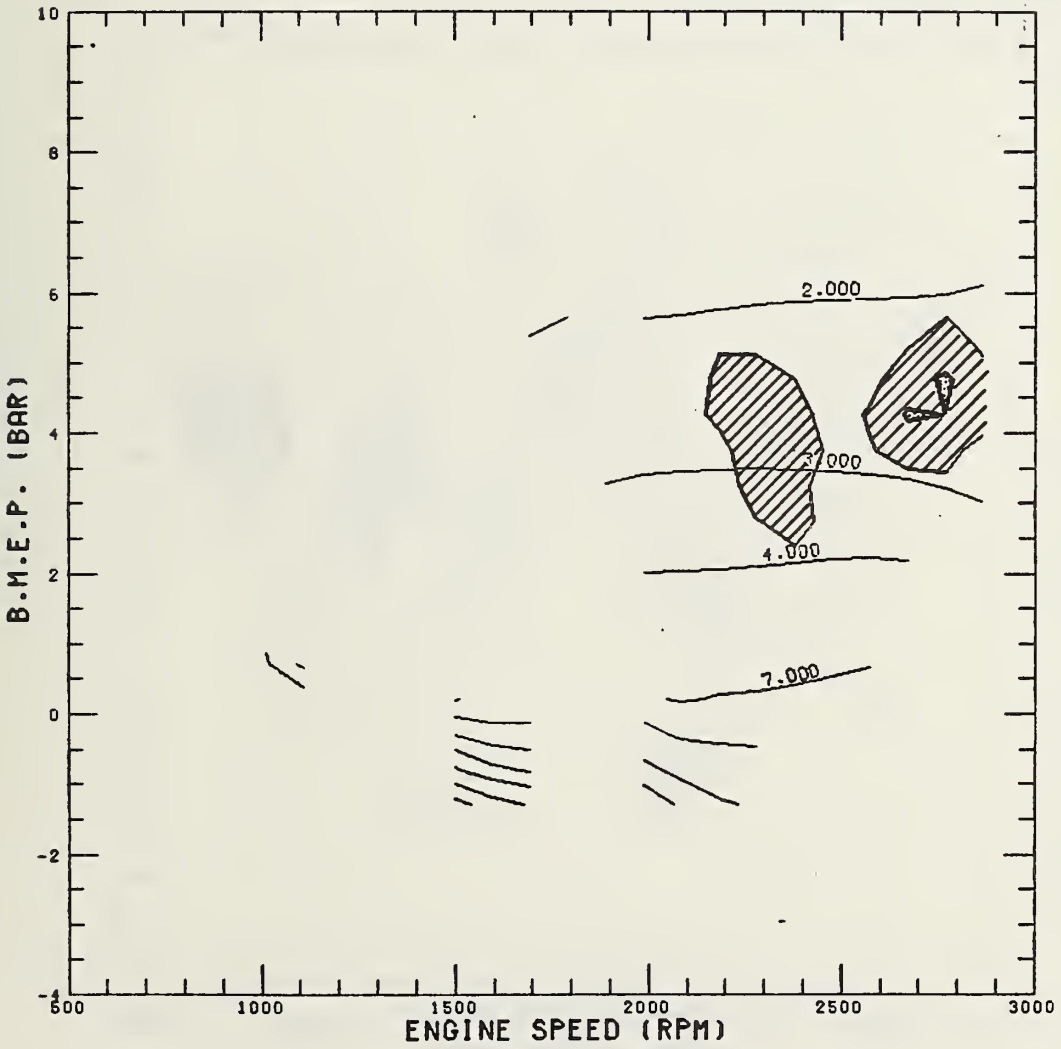
# FUEL CONSUMPTION (KG/H)

764.0 SEC HIGHWAY TEST DATE 10/11/76 13.03.54
TEST RESULT 688.17 G/ 10.25 MI = 46.51 MPG
SHADED REGIONS 336.02 72.69 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



## 70 HP TC 90 CID
## AIR TO FUEL RATIO

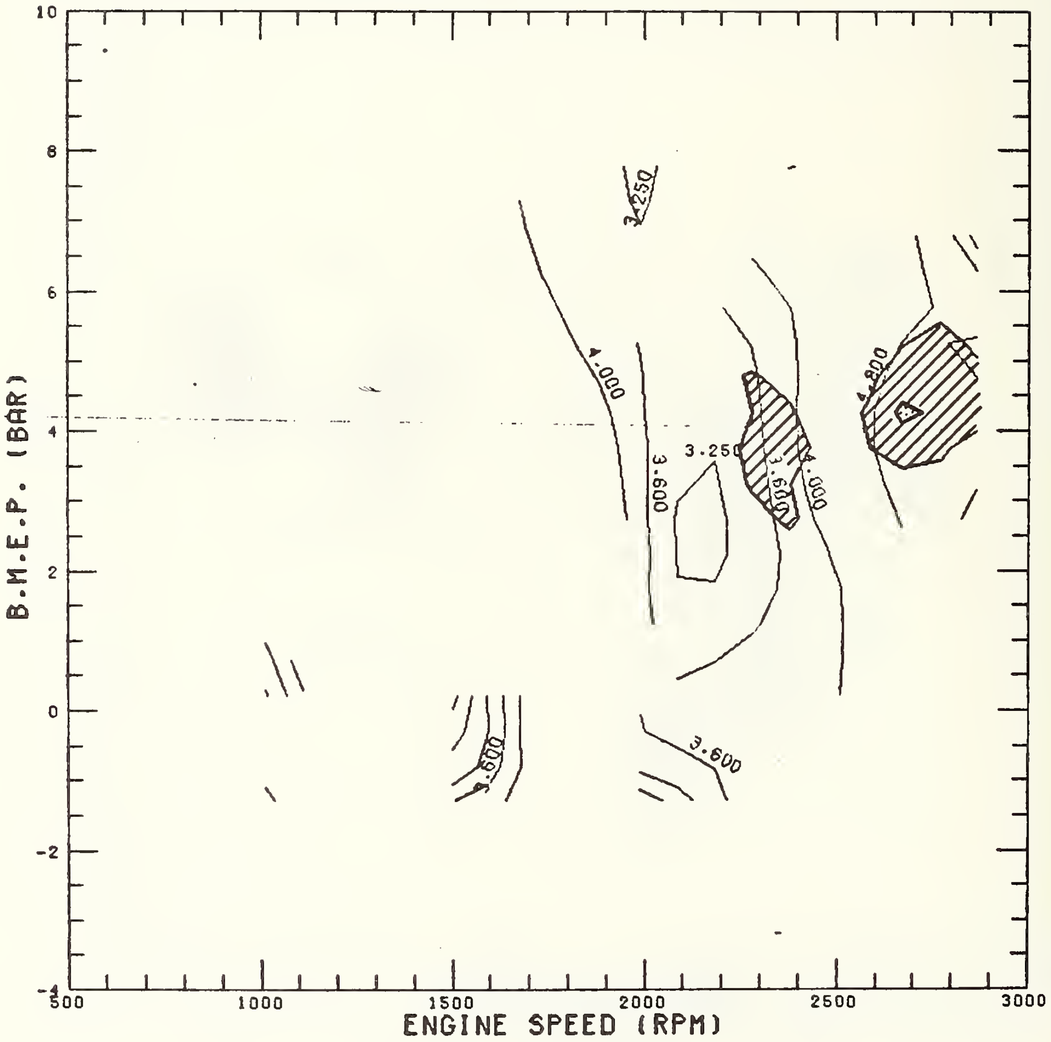
764.0 SEC HIGHWAY TEST DATE 10/11/76 . 13.03.54
TEST RESULT 764.25 S/ 10.25 MI = 48.28 MPH
SHADED REGIONS 377.37 95.25 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



## 70 HP TC 90 CID

## HC - EMISSION (G/H)

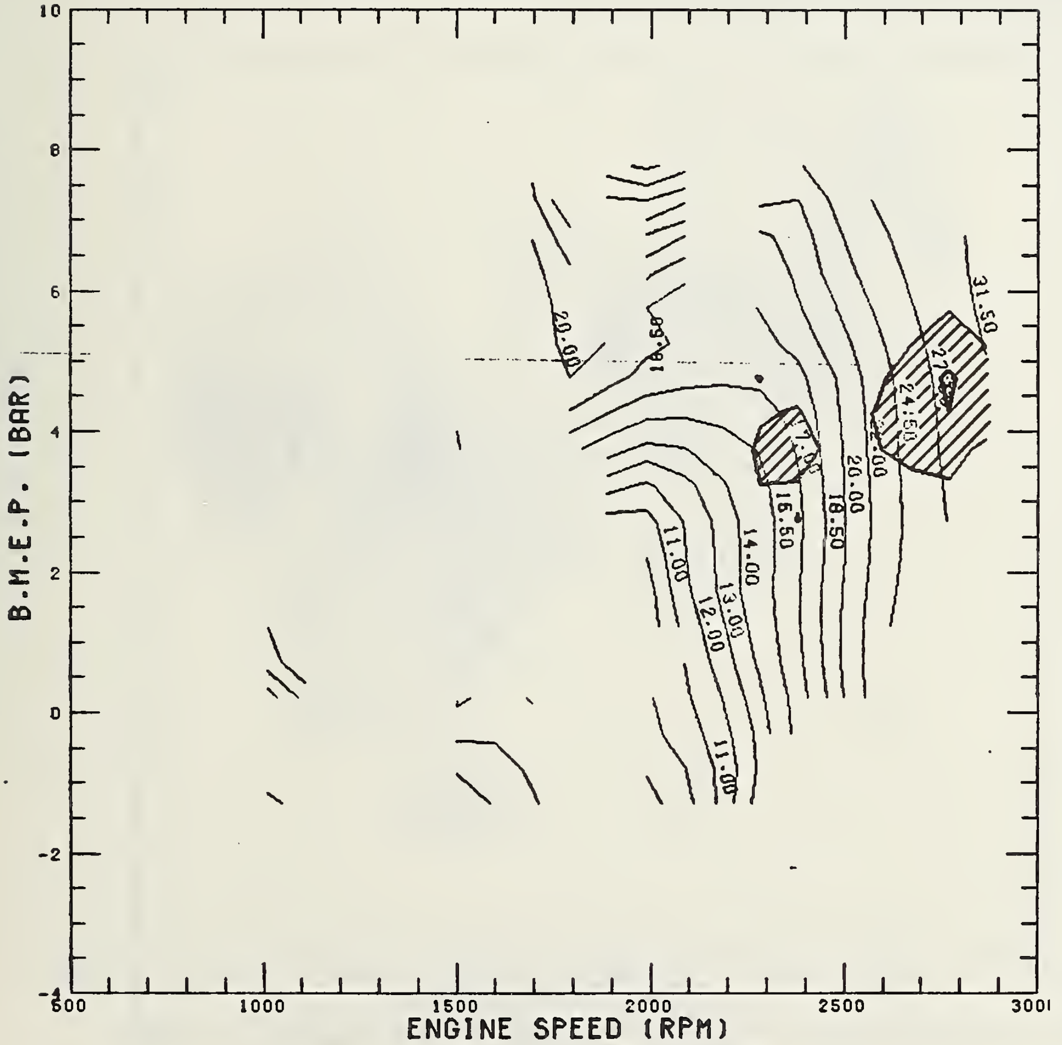
764.0 SEC HIGHWAY TEST DATE 10/11/76 13.03.54
TEST RESULT 0.83 G/ 10.25 MI = 0.08 G/MI
SHADED REGIONS 0.43 0.05 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



## 70 HP TC 90 CID

## CO - EMISSION (G/H)

764.0 SEC HIGHWAY TEST DATE 10/11/76 13.03.54
TEST RESULT 4.16 G/ 10.25 MI = 0.41 G/MI
SHADED REGIONS 2.02 0.50 G
VEHICLE 1020 KG MASS. 0.60 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



## 70 HP TC 90 CID

## NOX - EMISSION (G/H)

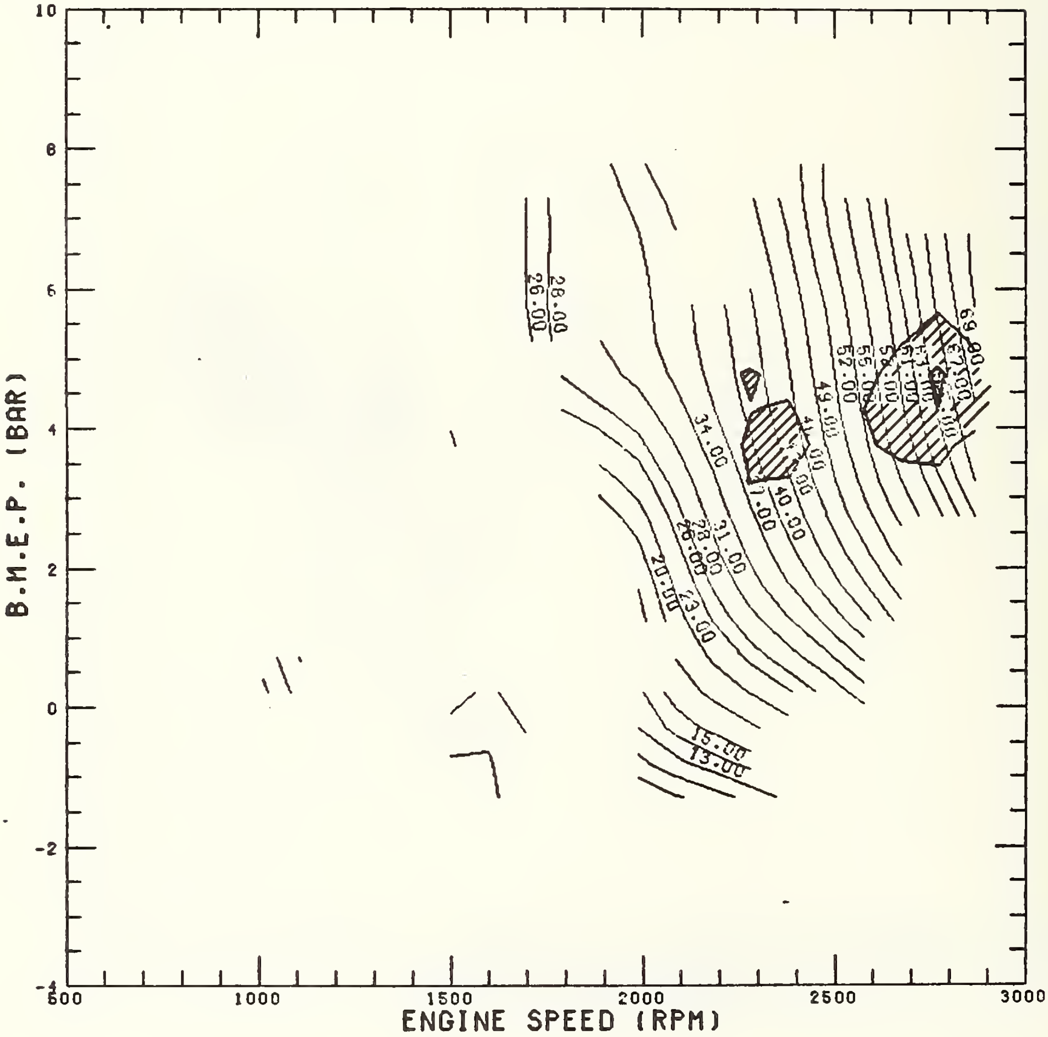
764.0 SEC HIGHWAY TEST DATE 10/11/76 13.03.54

TEST RESULT 9.49 G/ 10.25 MI = 0.93 G/MI

SHADED REGIONS 4.70 0.62 G

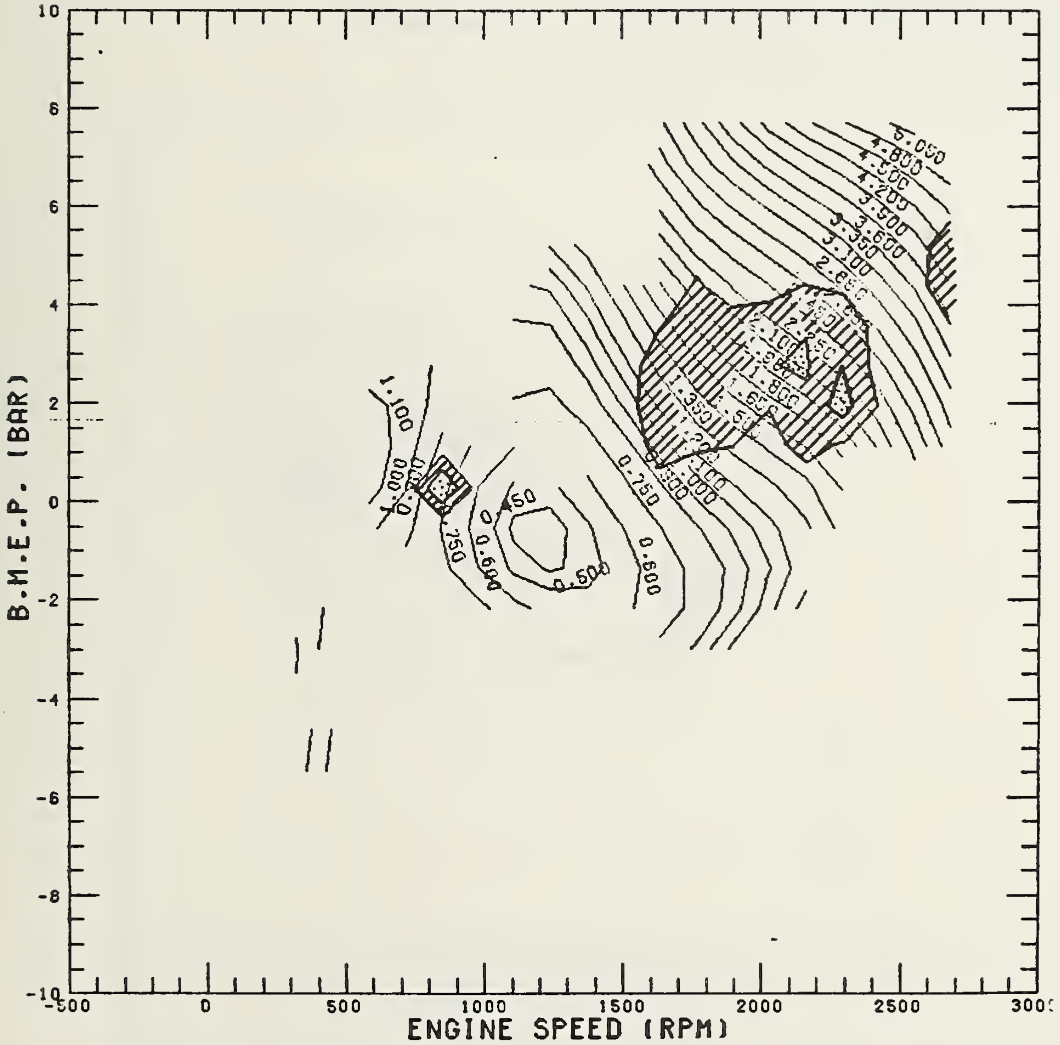
VEHICLE 1020 KG MASS, 0.80 SQM CW*F. 1.75 % ROLLING DRAG

TRANSMISSION AXLE/GEAR COMBINATION NO. 8



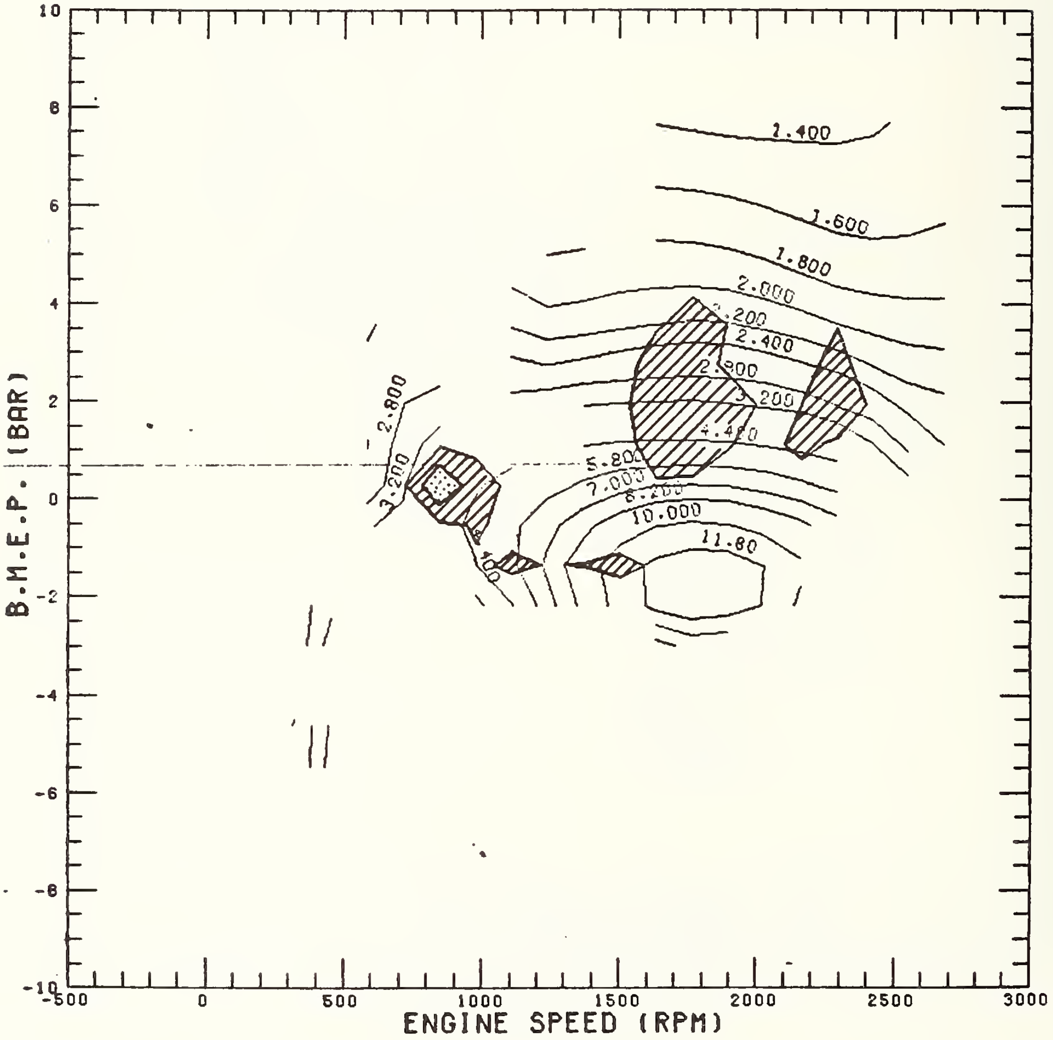
## 70 HP TC E.G.R.
## FUEL CONSUMPTION (KG/H)

1372.0 SEC US-CITY TEST DATE 18/05/77 11.01.27
TEST RESULT 525.92 G/ 7.45 MI = 44.34 MPG
SHADED REGIONS 259.34 56.28 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC E.G.R.
# AIR TO FUEL RATIO

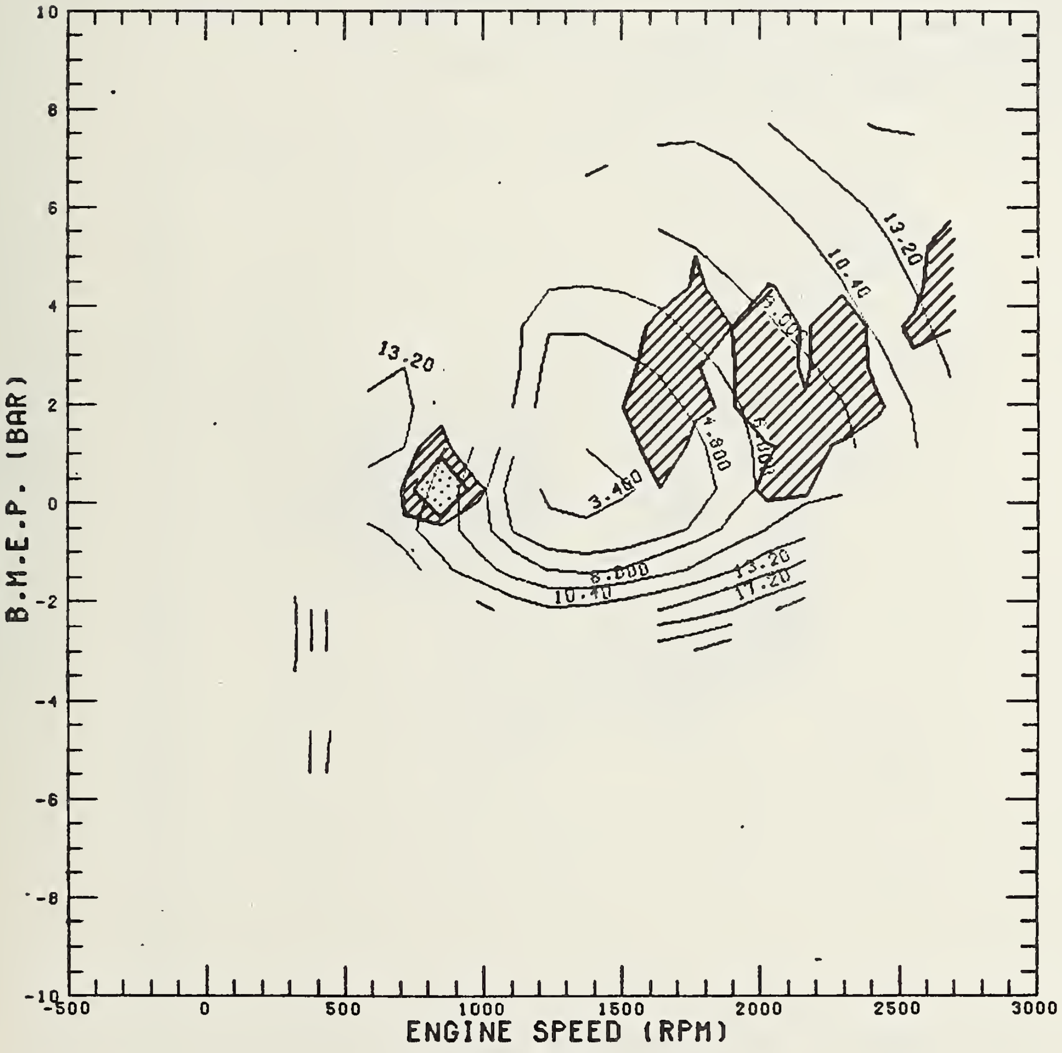
1372.0 SEC US-CITY TEST DATE 18/05/77 11.01.27
TEST RESULT 1372.25 S/ 7.45 MI = 19.54 MPH
SHADED REGIONS 691.12 231.87 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC E.G.R.

# HC - EMISSION (G/H)

1372.0 SEC US-CITY TEST DATE 18/05/77 11.01.27
TEST RESULT 2.21 G/ 7.45 MI = 0.30 G/MI .
SHADED REGIONS 1.11 0.17 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



## 70 HP TC E.G.R.

## CO - EMISSION (G/H)

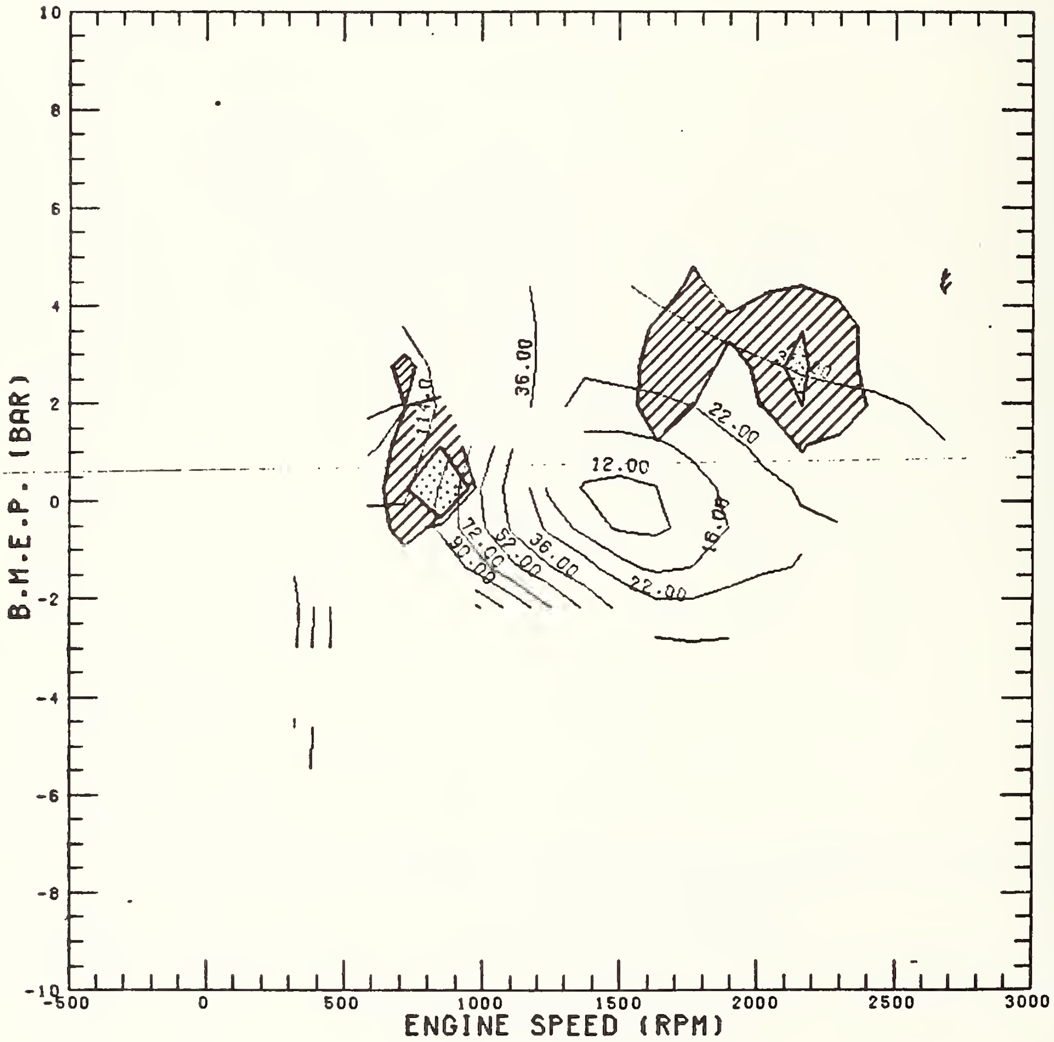
1372.0 SEC US-CITY TEST DATE 18/05/77 11.01.27

TEST RESULT 10.49 G/ 7.45 MI = 1.41 G/MI

SHADED REGIONS 5.12 0.90 G

VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG

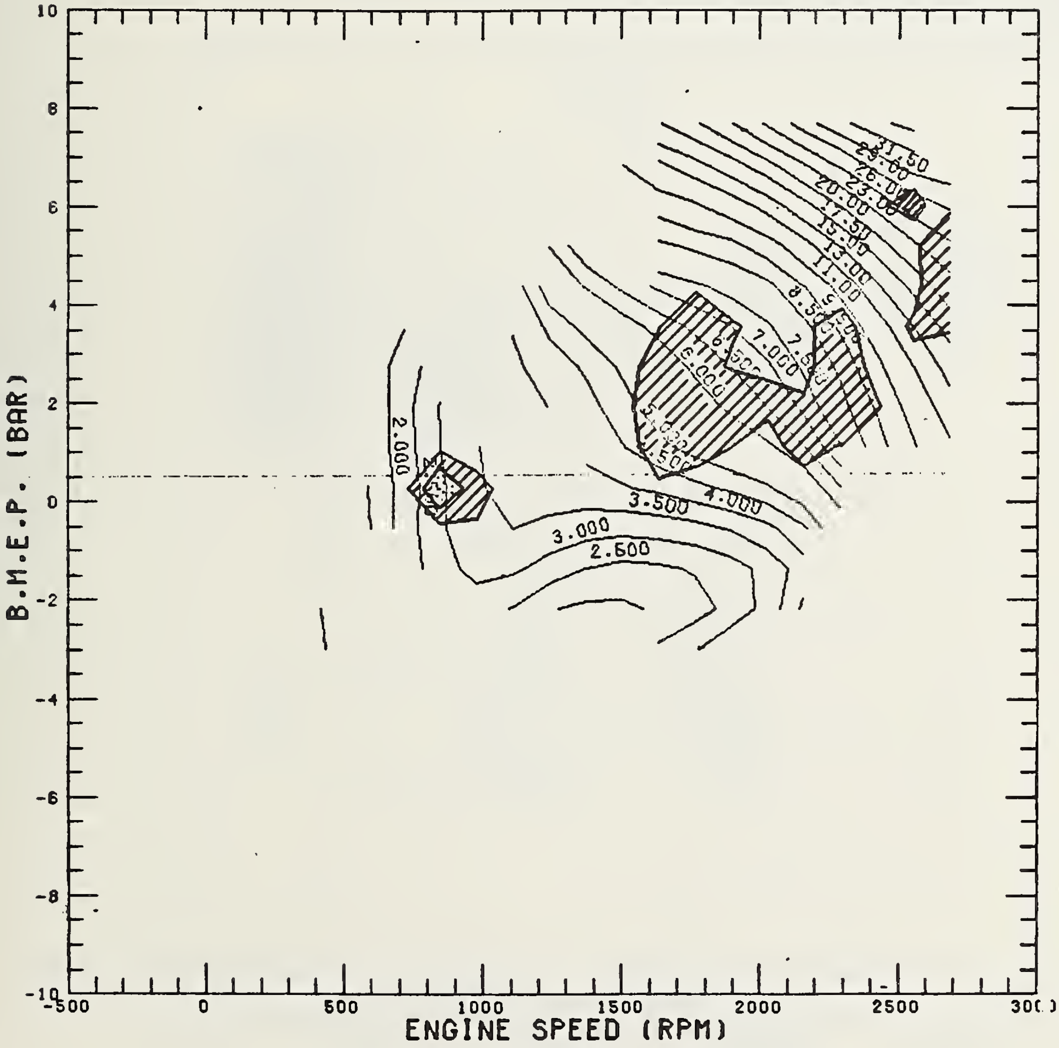
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



## 70 HP TC E.G.R.

## NOX - EMISSION (G/H)

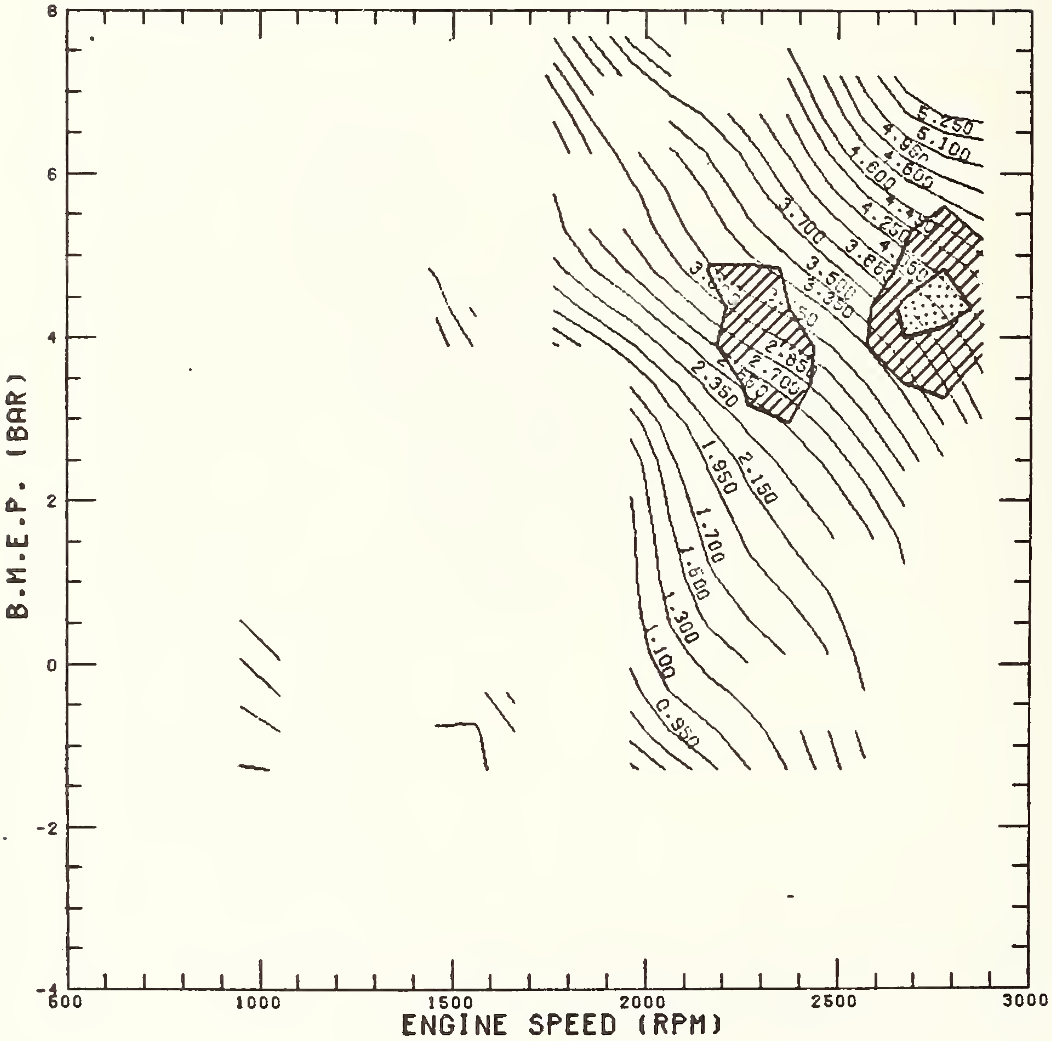
1372.0 SEC US-CITY TEST DATE 18/05/77 11.01.27
TEST RESULT 2.40 G/ 7.45 MI = 0.32 G/MI
SHADED REGIONS 1.19 0.25 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



70 HP TC E.G.R.

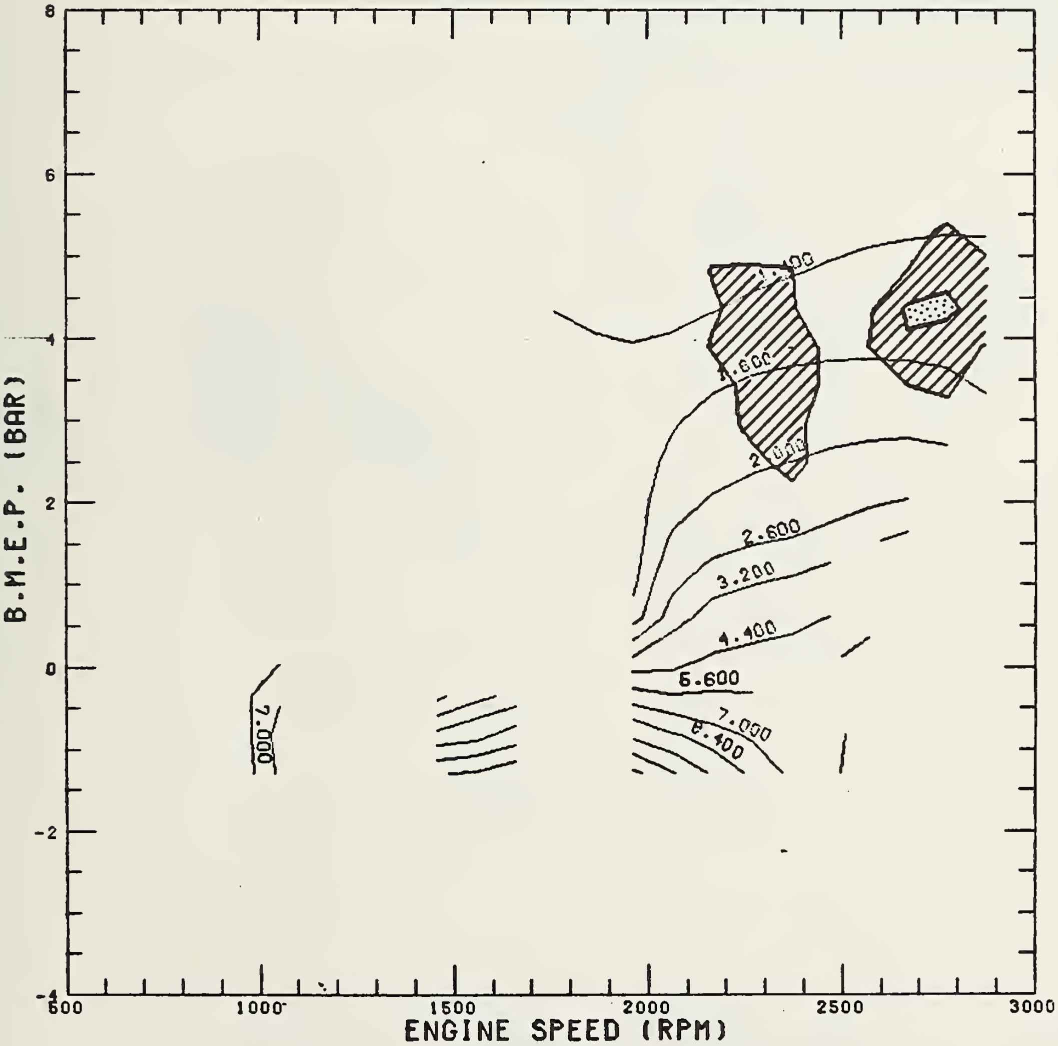
FUEL CONSUMPTION (KG/H)

764.0 SEC HIGHWAY TEST DATE 18/05/77 14.21.38
TEST RESULT 671.84 G/ 10.25 MI = 47.76 MPG
SHADED REGIONS 337.47 93.14 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC E.G.R.
# AIR TO FUEL RATIO

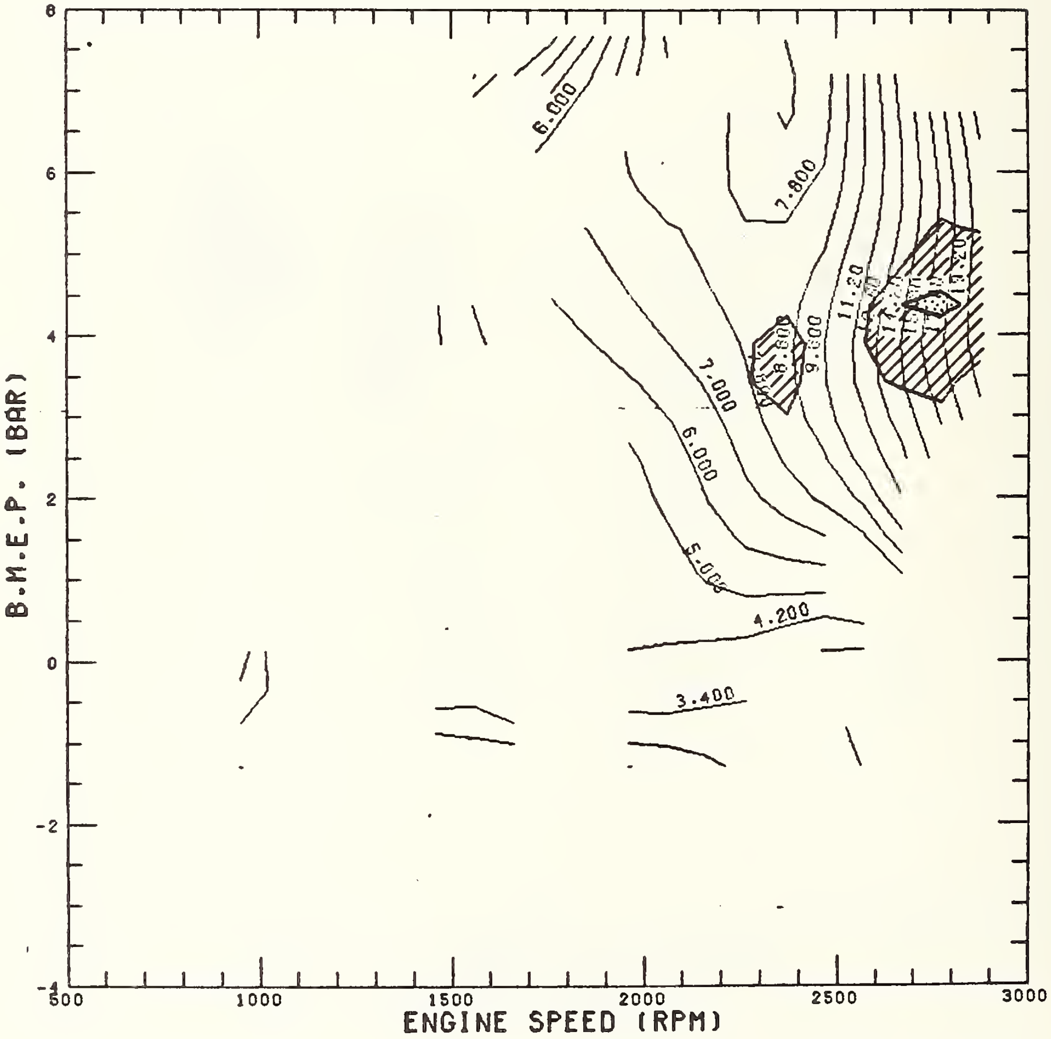
764.0 SEC HIGHWAY TEST DATE 18/05/77 14.21.38
TEST RESULT 764.25 S/ 10.25 MI = 48.28 MPH
SHADED REGIONS 391.75 88.87 M
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC E.G.R.

# HC - EMISSION (G/H)

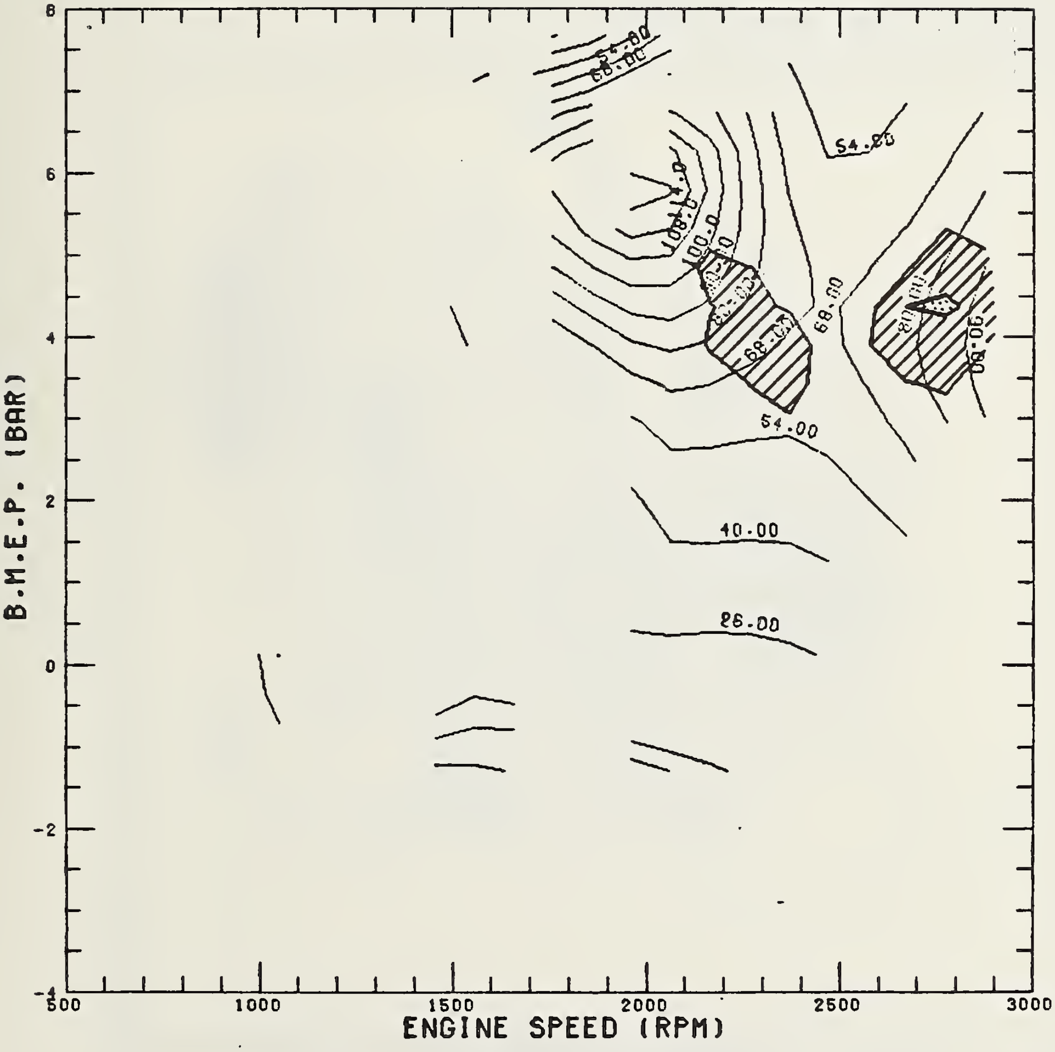
764.0 SEC HIGHWAY TEST DATE 18/05/77 14.21.38
TEST RESULT 2.24 G/ 10.25 MI = 0.22 G/MI
SHADED REGIONS 1.12 0.15 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 70 HP TC E.G.R.

# CO - EMISSION (G/H)

764.0 SEC HIGHWAY TEST DATE 18/05/77 14.21.38
TEST RESULT 14.22 G/ 10.25 MI = 1.39 G/MI
SHADED REGIONS 7.18 1.46 G
VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



70 HP TC E.G.R.

NOX - EMISSION (G/H)

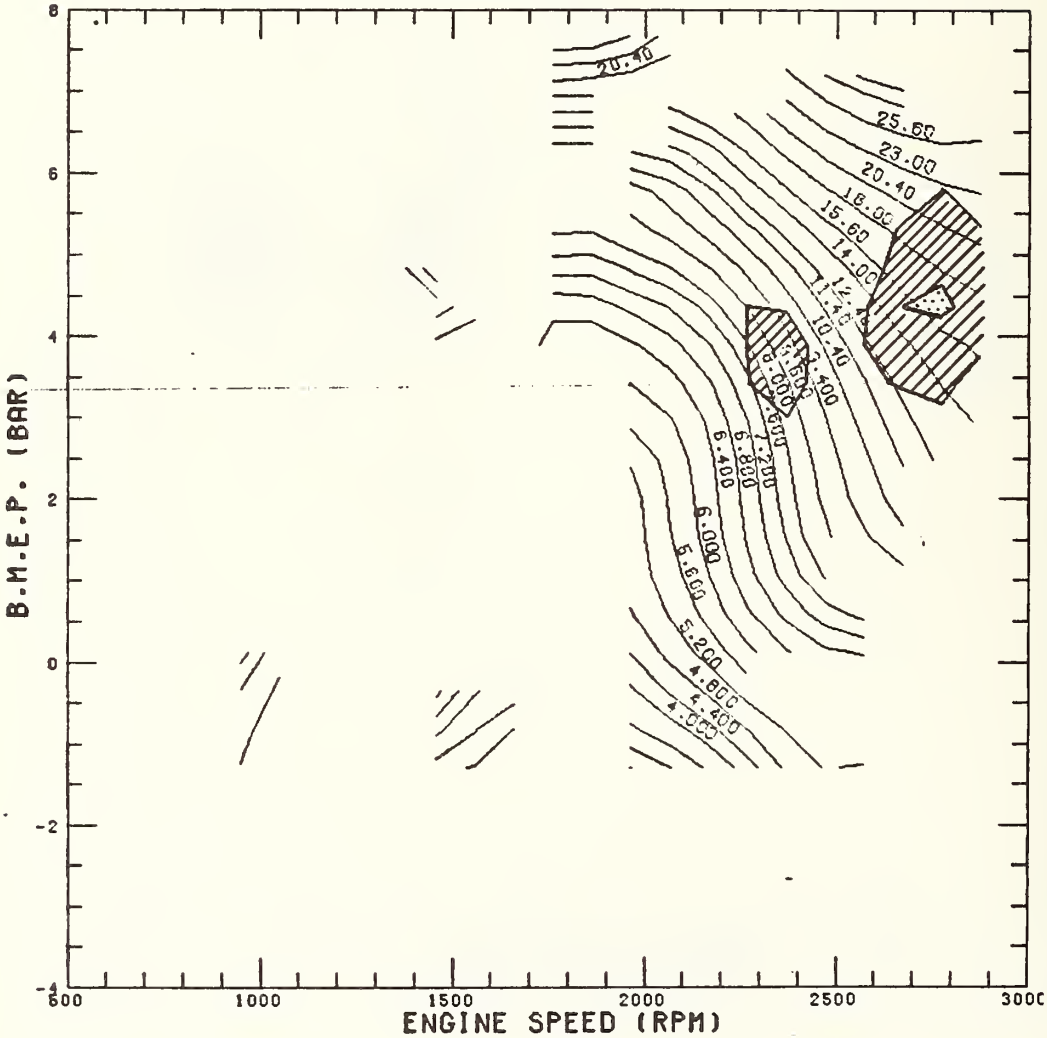
764.0 SEC HIGHWAY TEST DATE 18/05/77 14.21.38

TEST RESULT 2.49 G/ 10.25 MI = 0.24 G/MI

SHADED REGIONS 1.23 0.15 G

VEHICLE 1020 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG

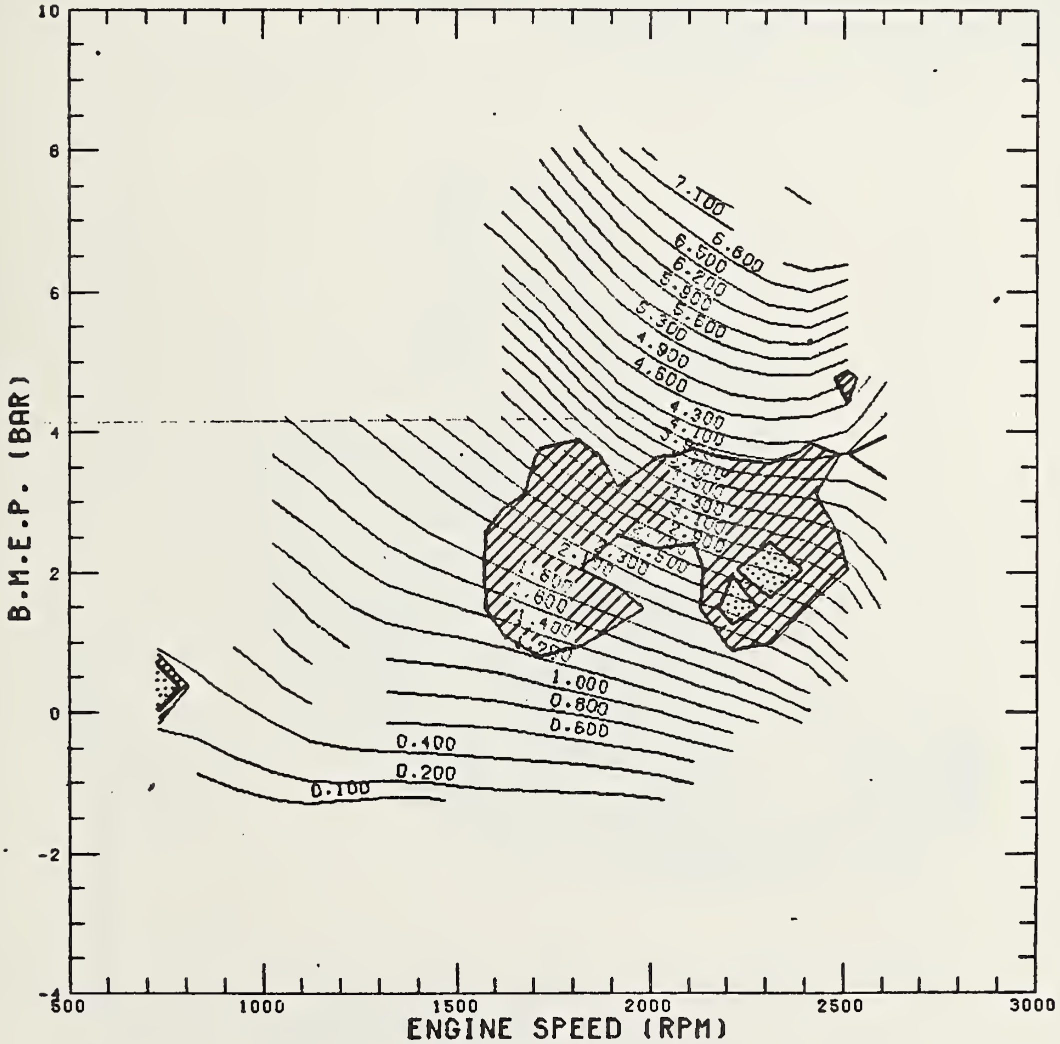
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



## 5 CYL. N.A. 130 CID

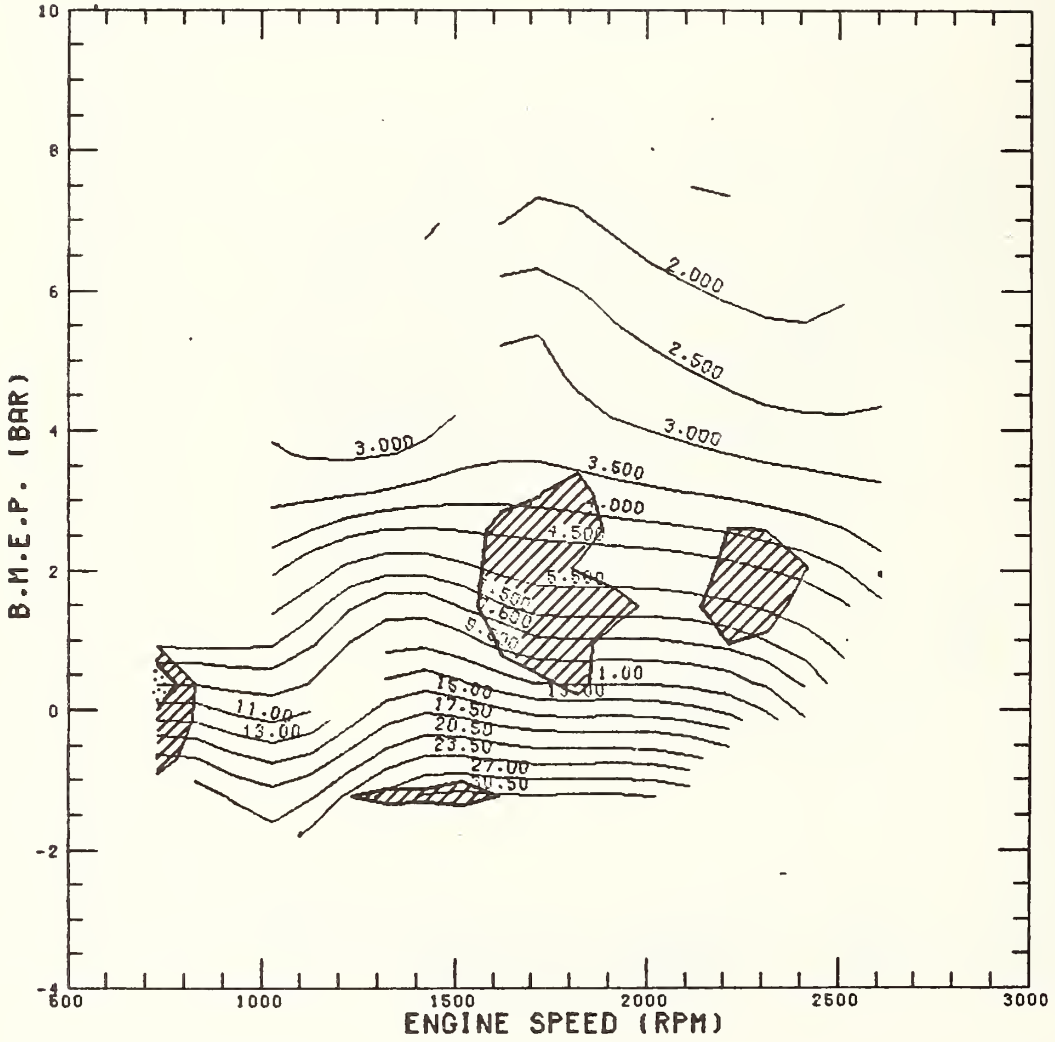
## FUEL CONSUMPTION (KG/H)

1372.0 SEC US-CITY TEST DATE 15/09/76 15.27.40
TEST RESULT 670.11 G/ 7.45 MI = 35.05 MPG
SHADED REGIONS 337.91 56.98 M
VEHICLE 1362 KG MASS. 0.80 SQM CW×F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



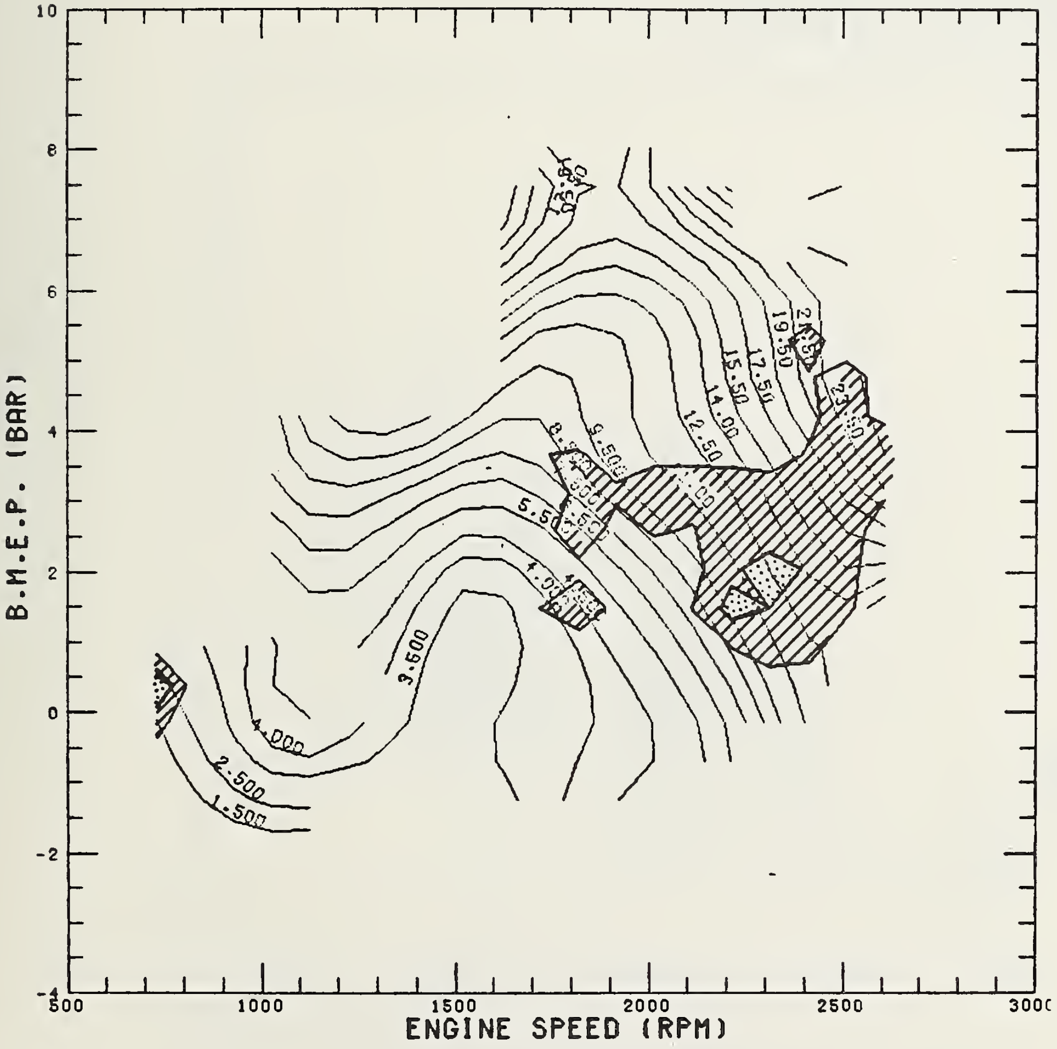
# 5 CYL. N.A. 130 CID
## AIR TO FUEL RATIO

1372.0 SEC US-CITY TEST DATE 15/09/76 15.27.40
TEST RESULT 1372.25 S/ 7.45 MI = 19.54 MPH
SHADED REGIONS 688.75 229.87 M
VEHICLE 1362 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



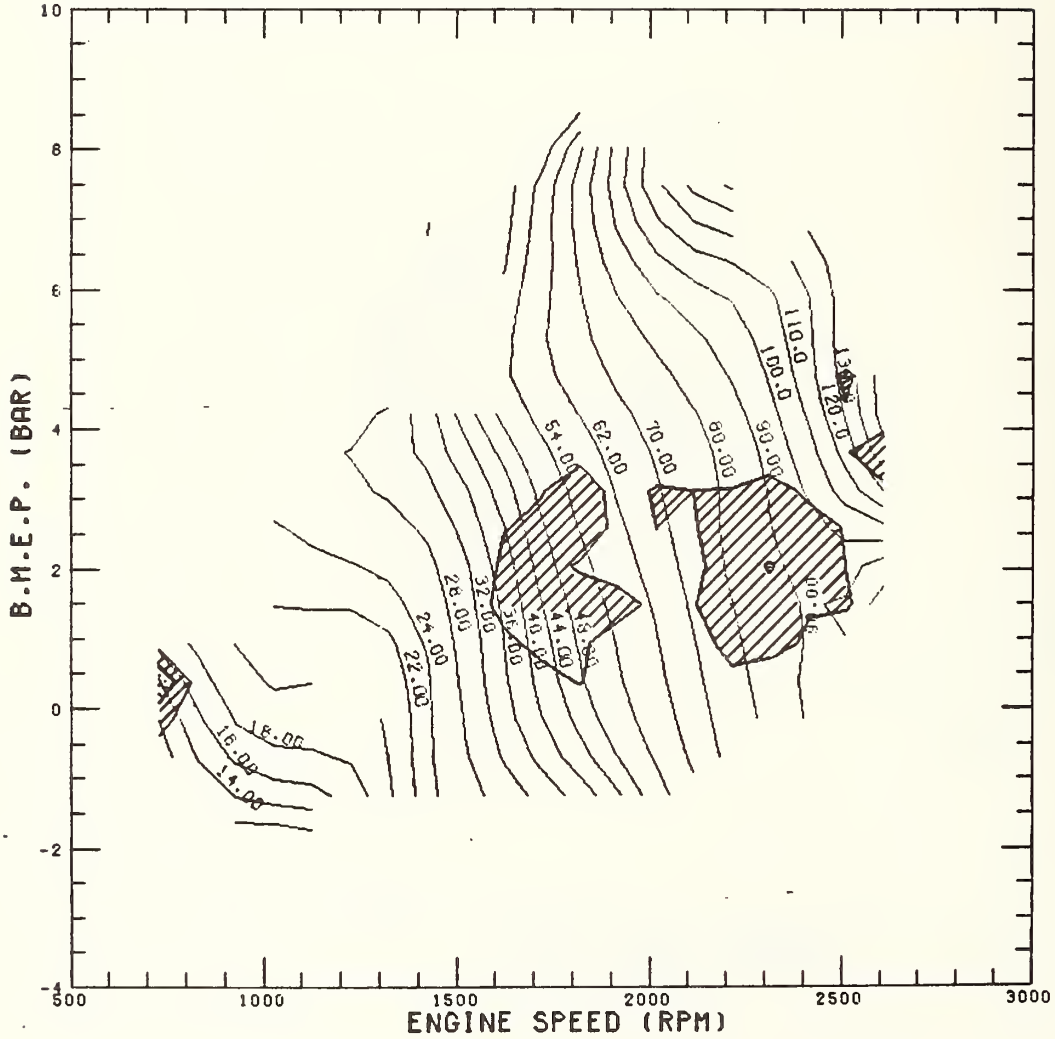
# 5 CYL. N.A. 130 CID
# HC - EMISSION (G/H)

1372.0 SEC US-CITY TEST DATE 15/09/76 15.27.40
TEST RESULT 2.35 G/ 7.45 MI = 0.32 G/MI
SHADED REGIONS 1.19 0.23 G
VEHICLE 1362 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8

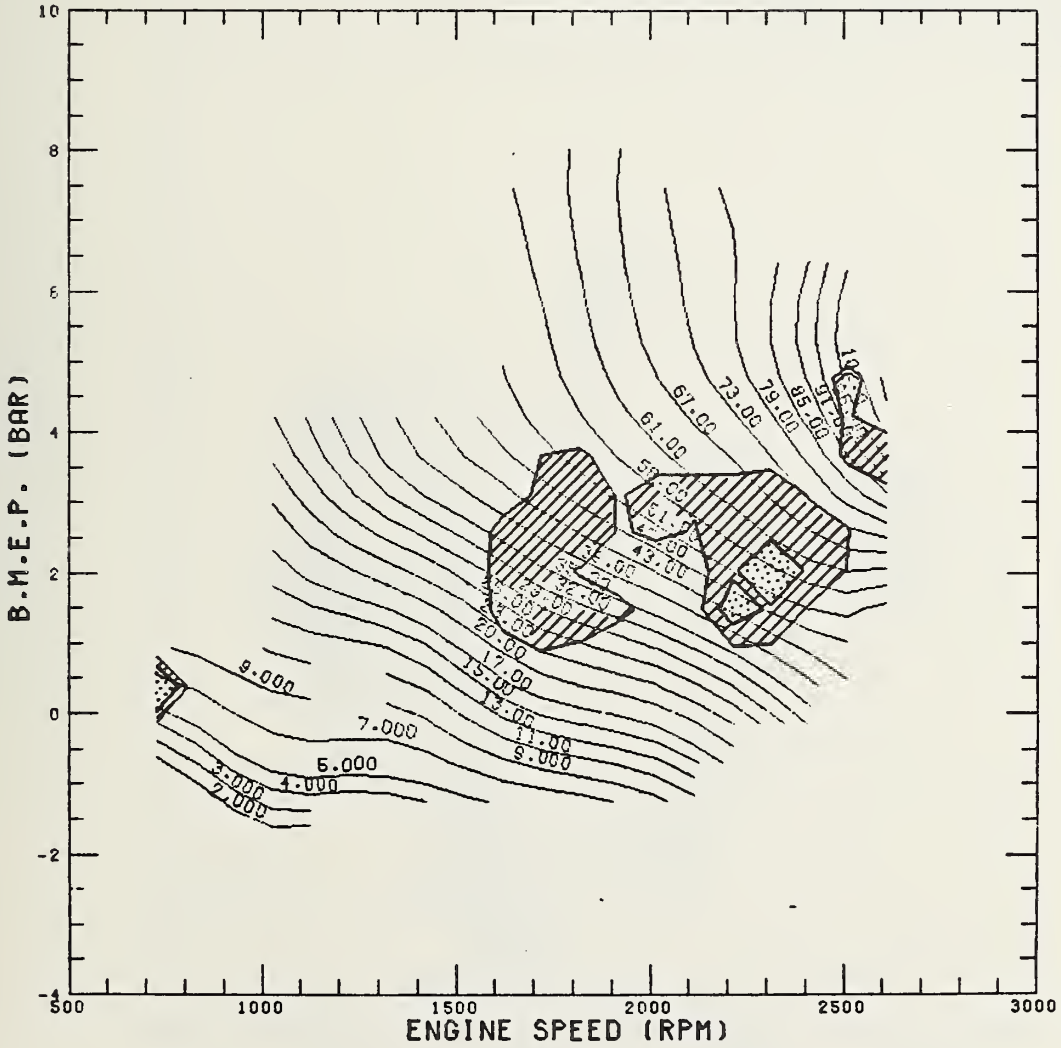


## 5 CYL. N.A. 130 CID
## CO - EMISSION (G/H)

1372.0 SEC US-CITY TEST DATE 15/09/76 15.27.40
TEST RESULT 17.44 G/ 7.45 MI = 2.34 G/MI
SHADED REGIONS 8.61 2.03 G
VEHICLE 1362 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8

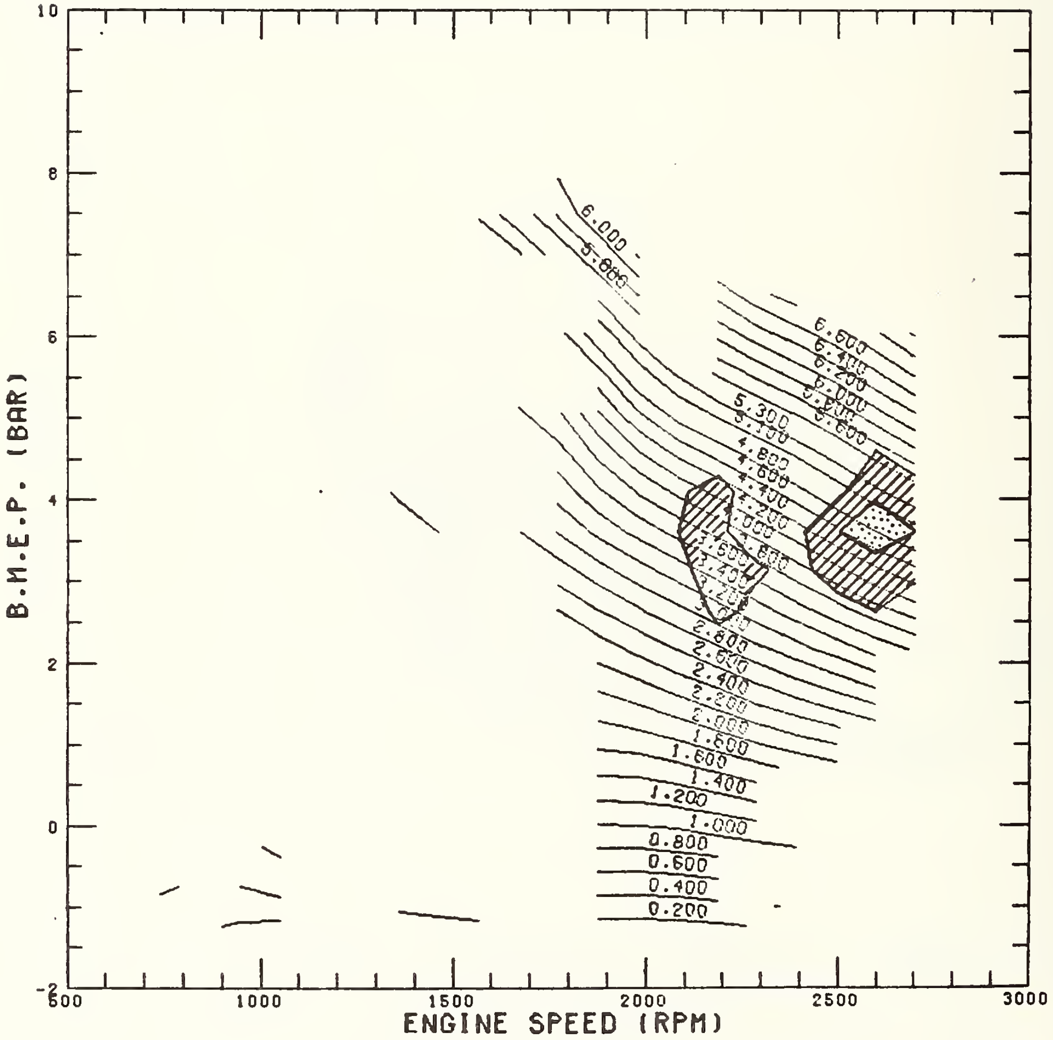


5 CYL. N.A. 130 CID
NOX - EMISSION (G/H)
1372.0 SEC US-CITY TEST DATE 15/09/76 15.27.40
TEST RESULT 11.13 G/ 7.45 MI = 1.49 G/MI
SHADED REGIONS 5.56 1.10 G
VEHICLE 1362 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



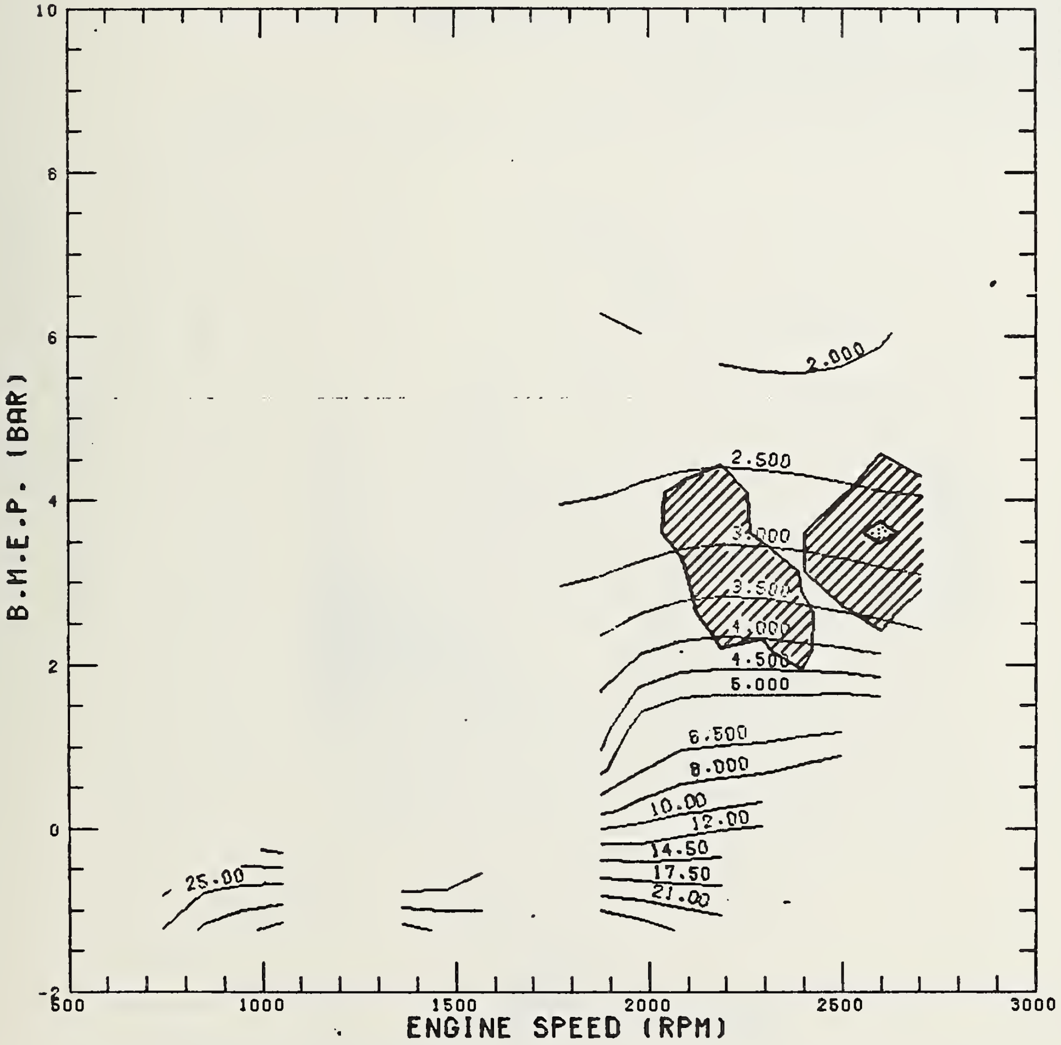
## 5 CYL. N.A. 130 CID
## FUEL CONSUMPTION (KG/H)

764.0 SEC HIGHWAY TEST DATE 15/09/76 15.49.37
TEST RESULT 810.15 G/ 10.25 MI = 39.89 MPG
SHADED REGIONS 409.52 93.46 M
VEHICLE 1362 KG MASS, 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 5 CYL. N.A. 130 CID
# AIR TO FUEL RATIO

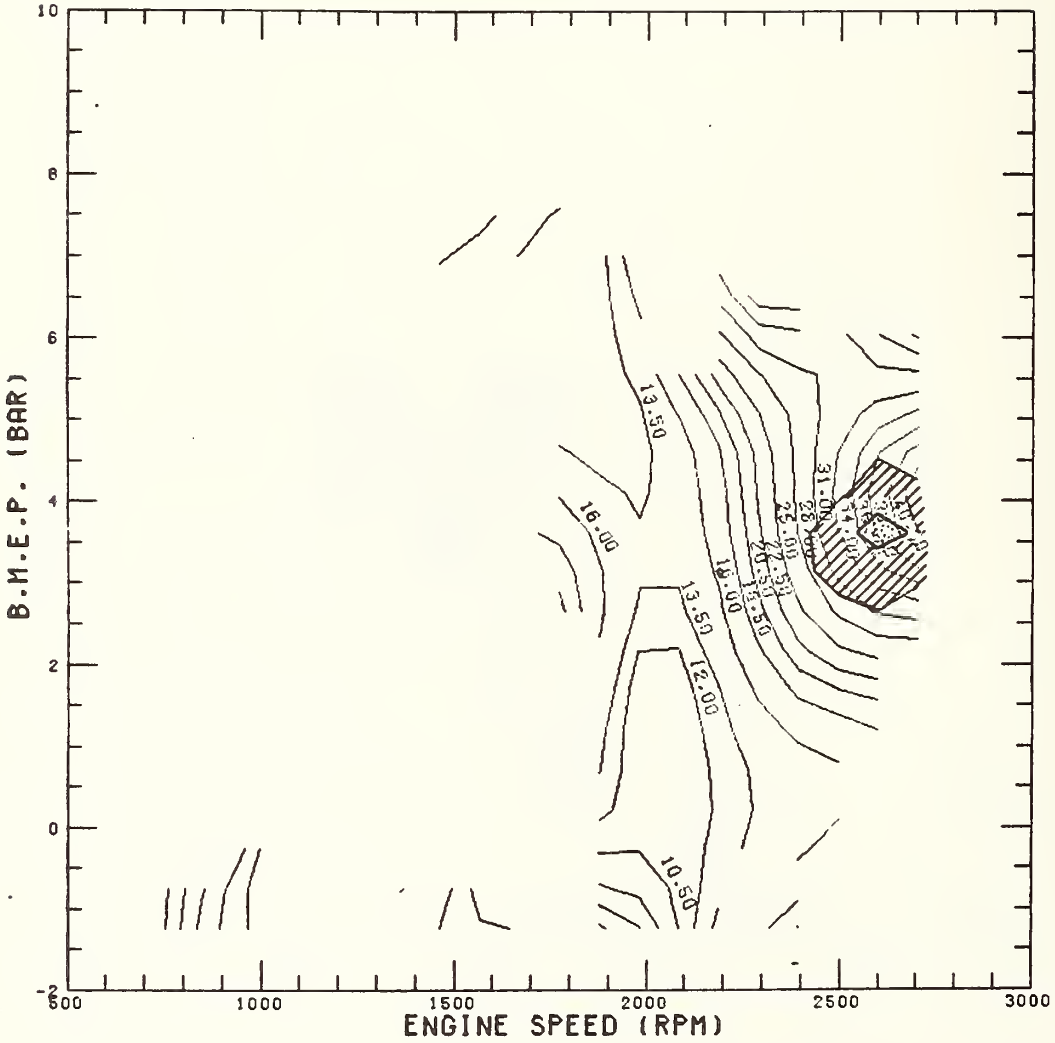
764.0 SEC HIGHWAY TEST DATE 15/09/76 15.49.37
TEST RESULT 764.25 S/ 10.25 MI = 48.28 MPH
SHADED REGIONS 389.37 78.25 M
VEHICLE 1362 KG MASS, 0.80 SQM CW*F, 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 5 CYL. N.A. 130 CID

## HC - EMISSION (G/H)

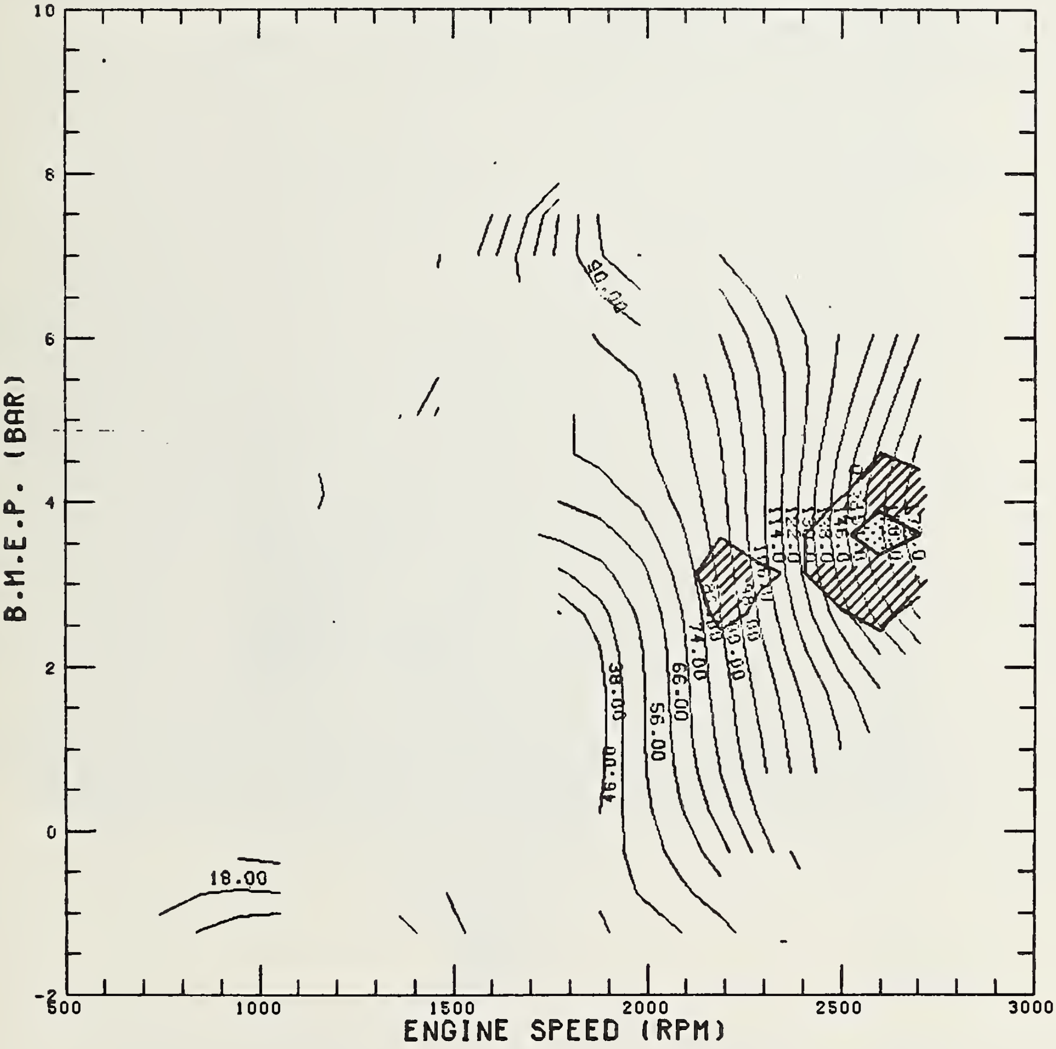
764.0 SEC HIGHWAY TEST DATE 15/09/76 15.49.37
TEST RESULT 4.90 G/ 10.25 MI = 0.48 G/MI
SHADED REGIONS 2.45 0.53 G
VEHICLE 1362 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# 5 CYL. N.A. 130 CID

# CO - EMISSION (G/H)

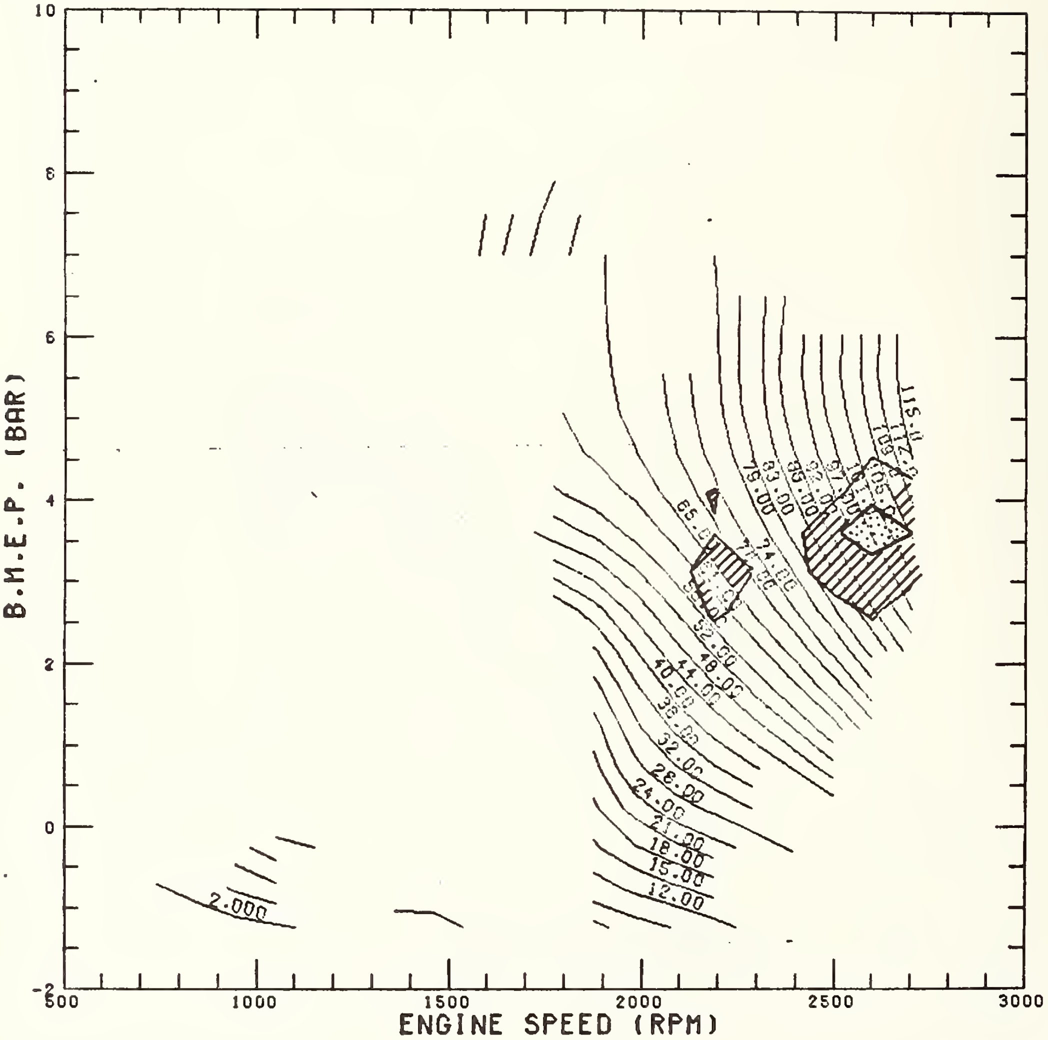
764.0 SEC HIGHWAY TEST DATE 15/09/76 15.49.37
TEST RESULT 23.43 G/ 10.25 MI = 2.29 G/MI
SHADED REGIONS 11.70 2.10 G
VEHICLE 1362 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



## 5 CYL. N.A. 130 CID

## NOX - EMISSION (G/H)

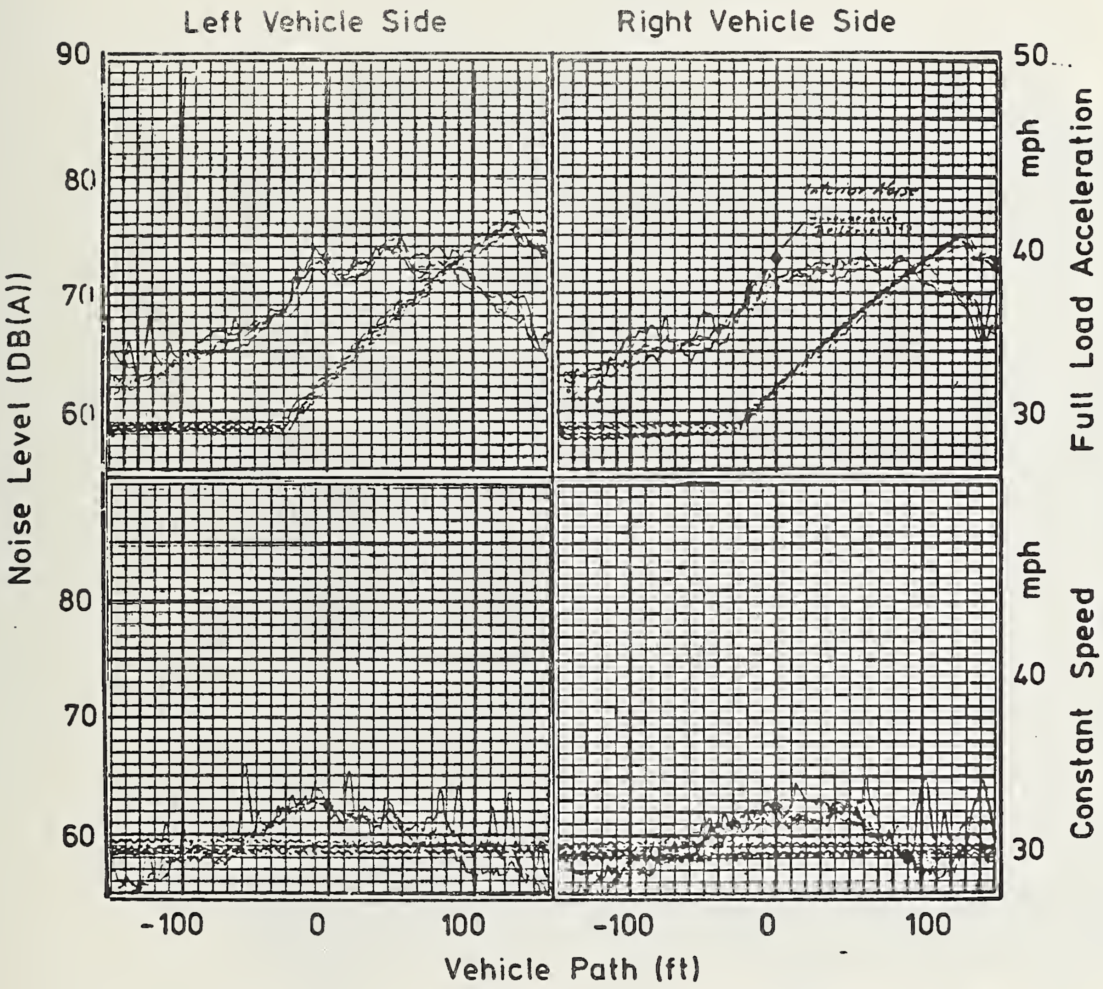
764.0 SEC HIGHWAY TEST DATE 15/09/76 15.49.37
TEST RESULT 14.72 G/ 10.25 MI = 1.44 G/MI
SHADED REGIONS 7.09 1.20 G
VEHICLE 1362 KG MASS. 0.80 SQM CW*F. 1.75 % ROLLING DRAG
TRANSMISSION AXLE/GEAR COMBINATION NO. 8



# NOISE EMISSION

GOLF D NO. 1 WITH 50 HP PRODUCTION DIESEL

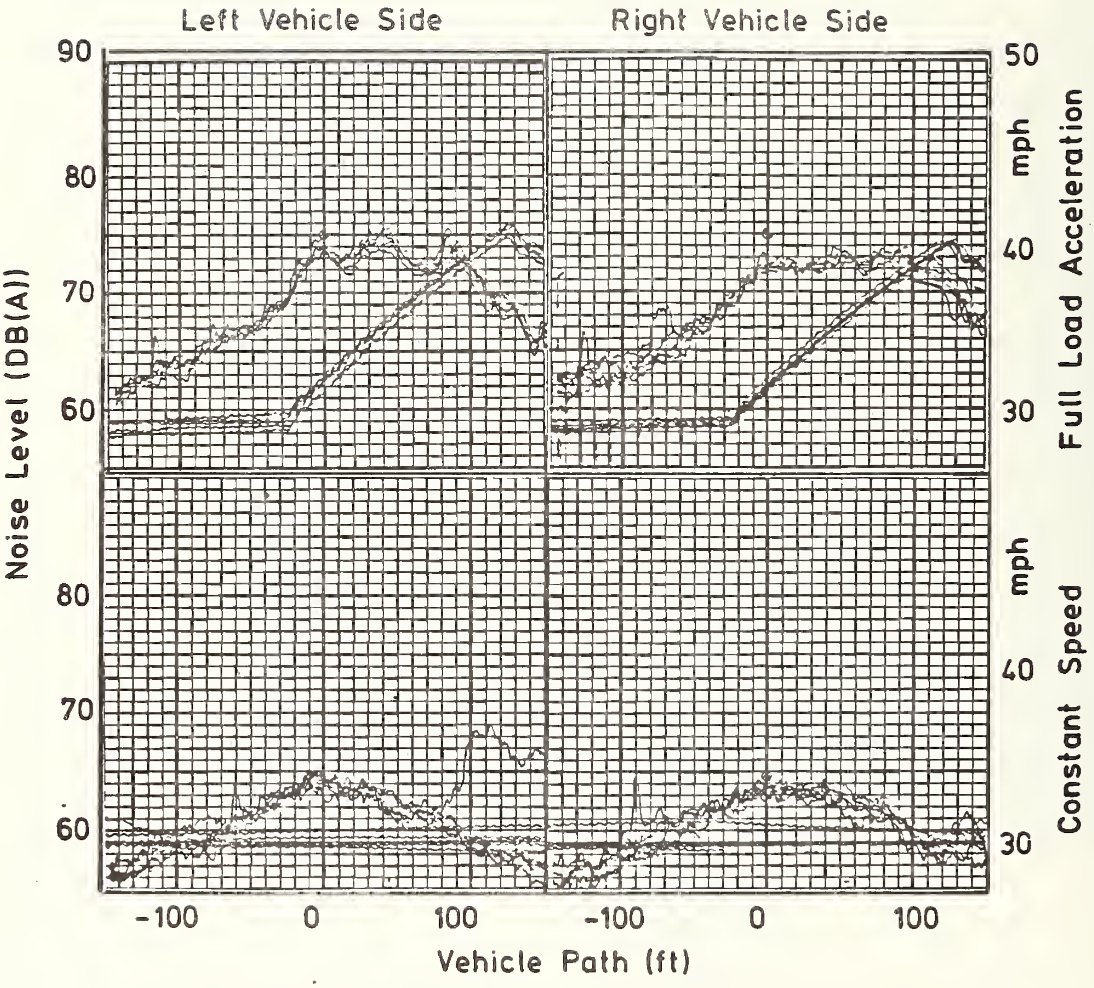
Idle Noise 79 dB(A) exterior
58 dB(A) interior



# NOISE EMISSION

GOLF D NO. 2 WITH 50 HP PRODUCTION DIESEL

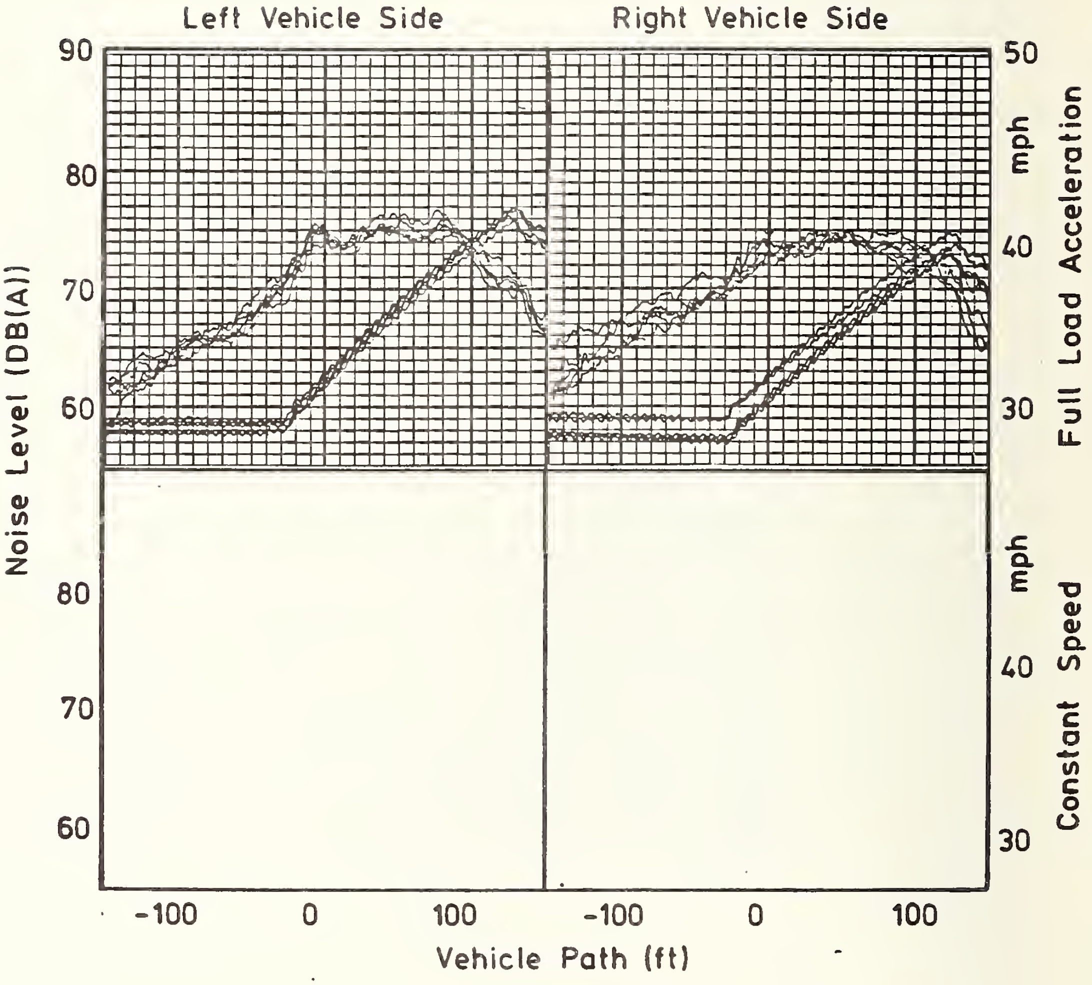
Idle Noise 79 dB(A) exterior
56 dB(A) interior



## NOISE EMISSION

GOLF D NO. 4 WITH 50 HP PRODUCTION DIESEL

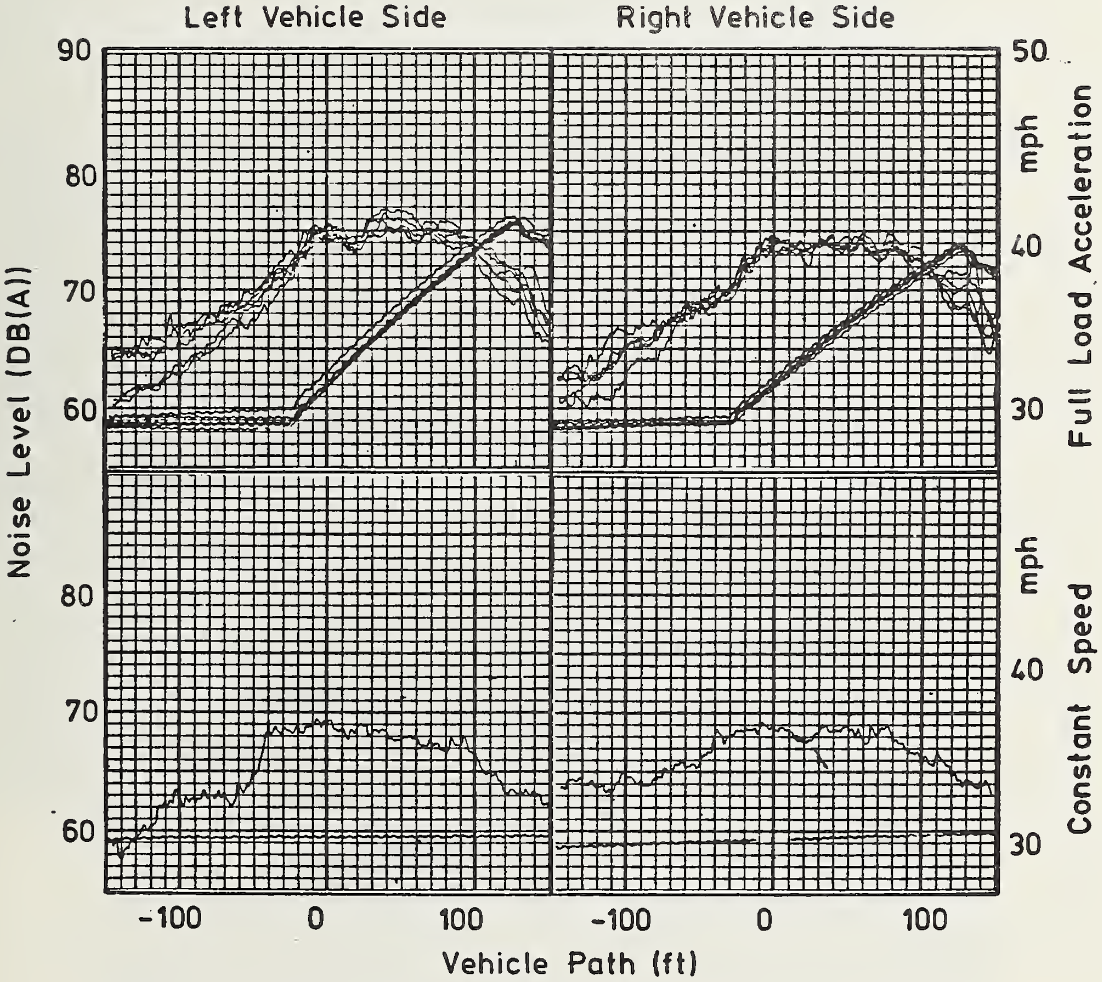
Idle Noise 80 dB(A) exterior
54.5 dB(A) interior



# NOISE EMISSION

GOLF D NO. 5 WITH 50 HP PRODUCTION DIESEL
wet surface

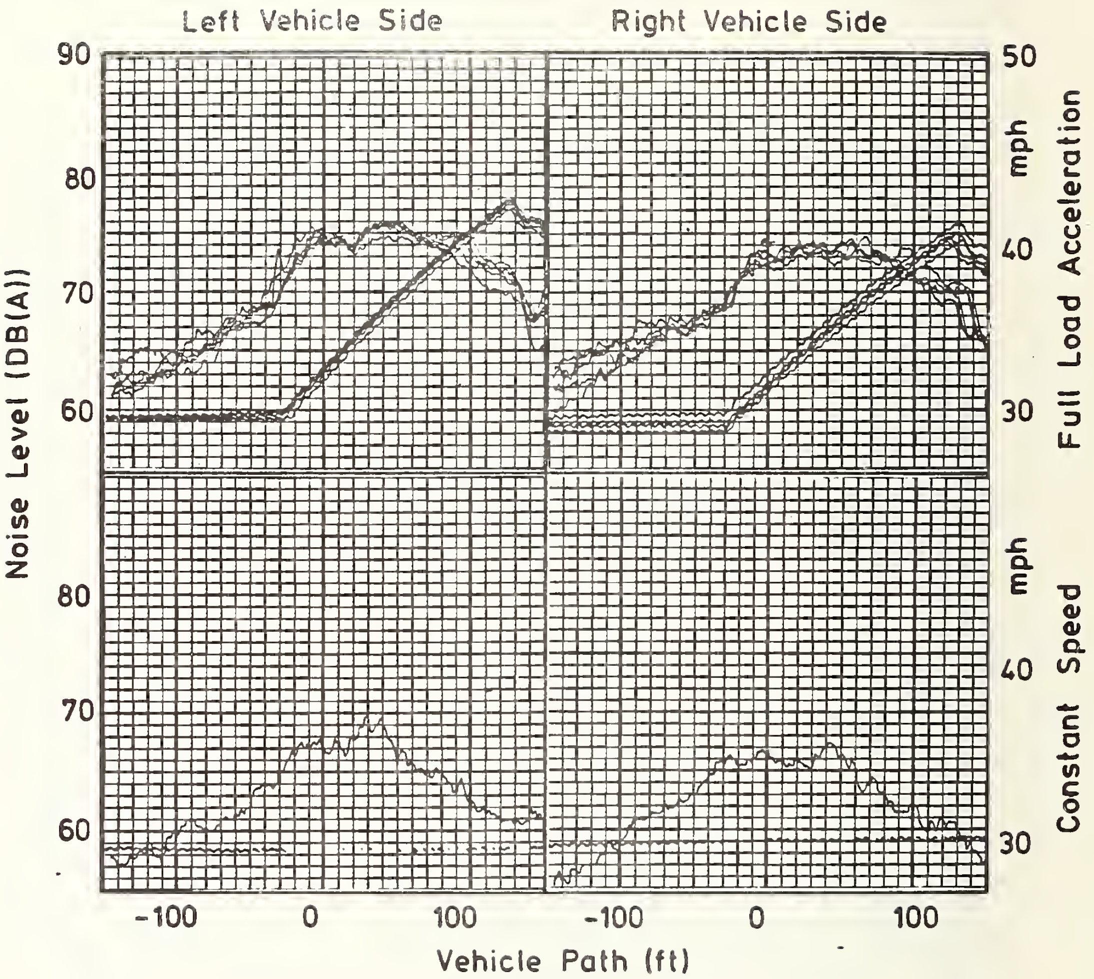
Idle Noise 81 dB(A) exterior
56 dB(A) interior



# NOISE EMISSION

GOLF D NO. 6 WITH 50 HP PRODUCTION DIESEL
wet surface

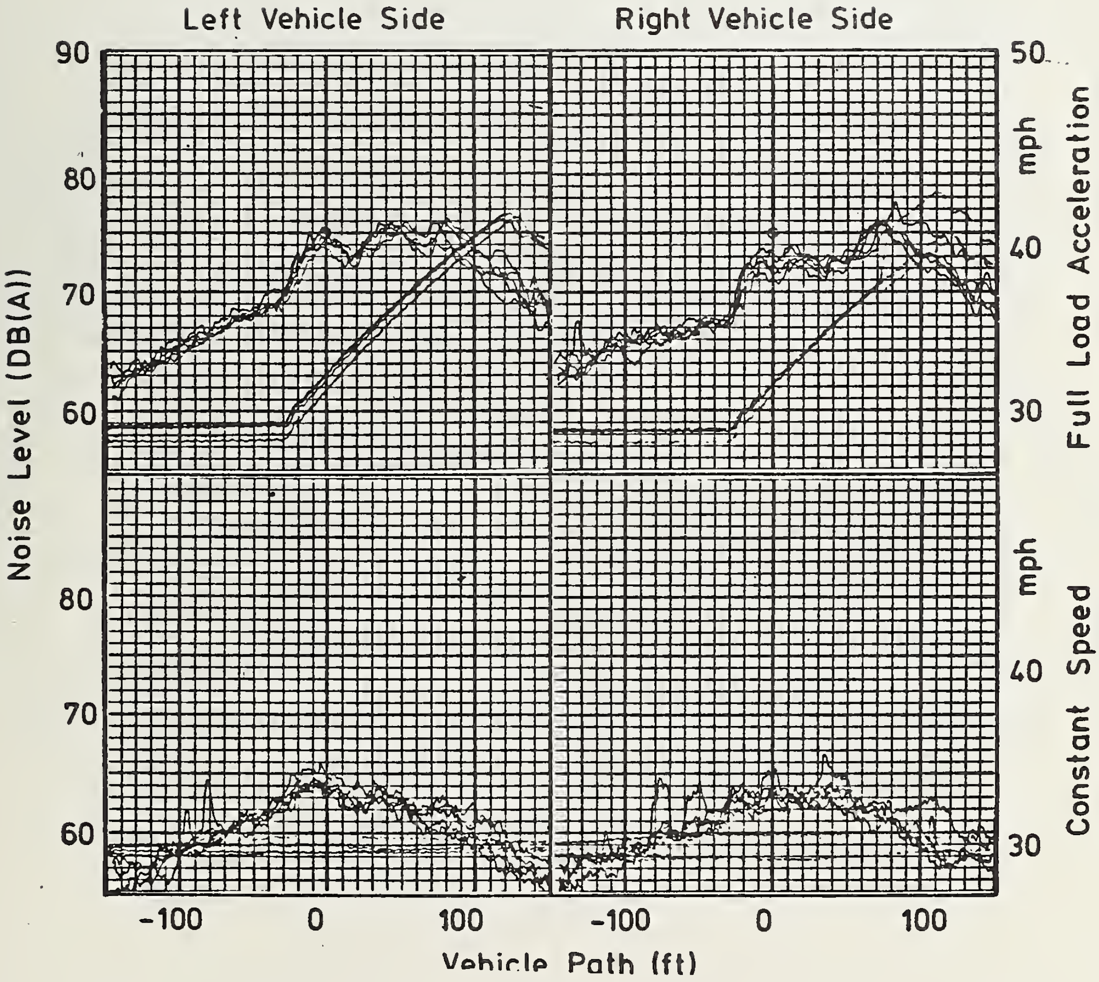
Idle Noise 81 dB(A) exterior
55 dB(A) interior



# NOISE EMISSION

GOLF LD NO. 1 WITH 50 HP PRODUCTION DIESEL

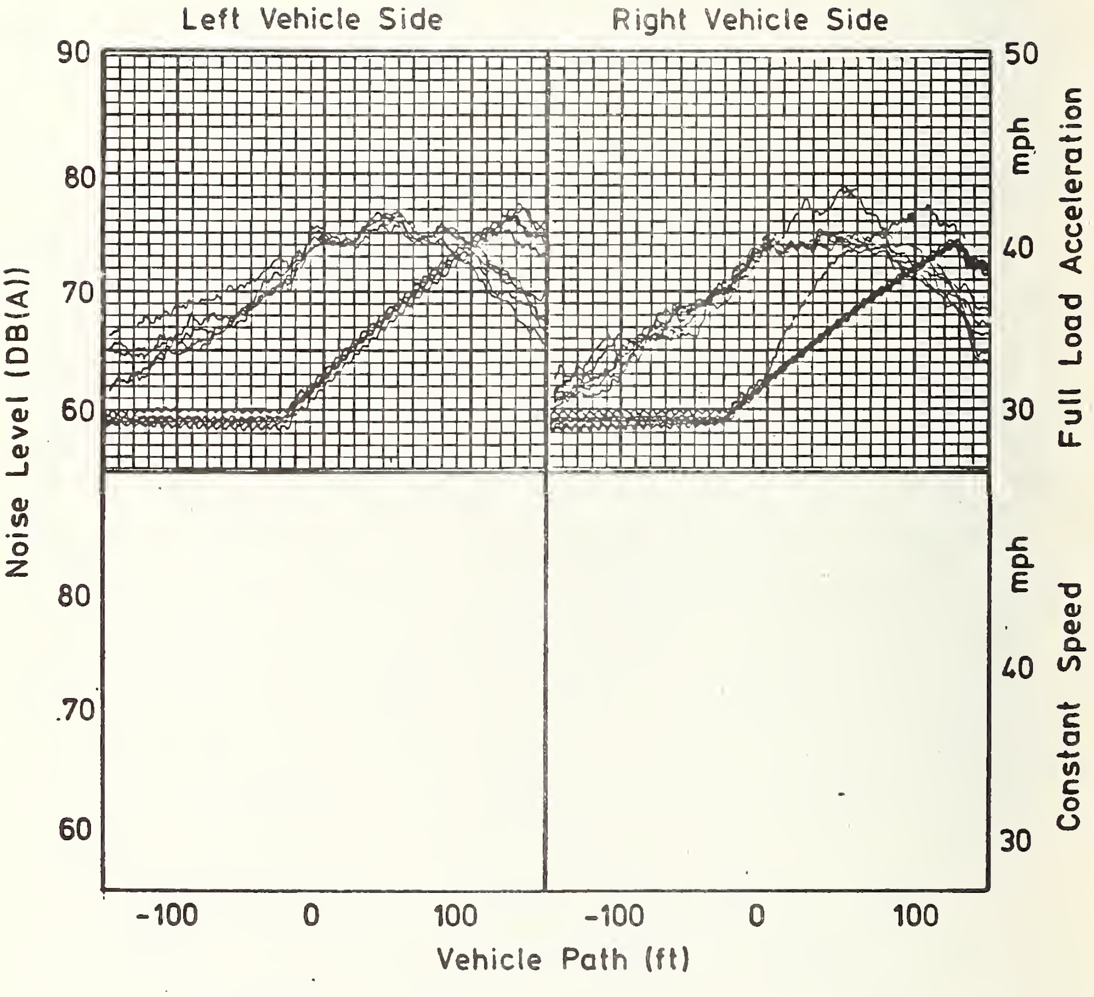
Idle Noise 79.5 dB(A) exterior
54 dB(A) interior



# NOISE EMISSION

GOLF LD NO. 2 WITH 50 HP PRODUCTION DIESEL

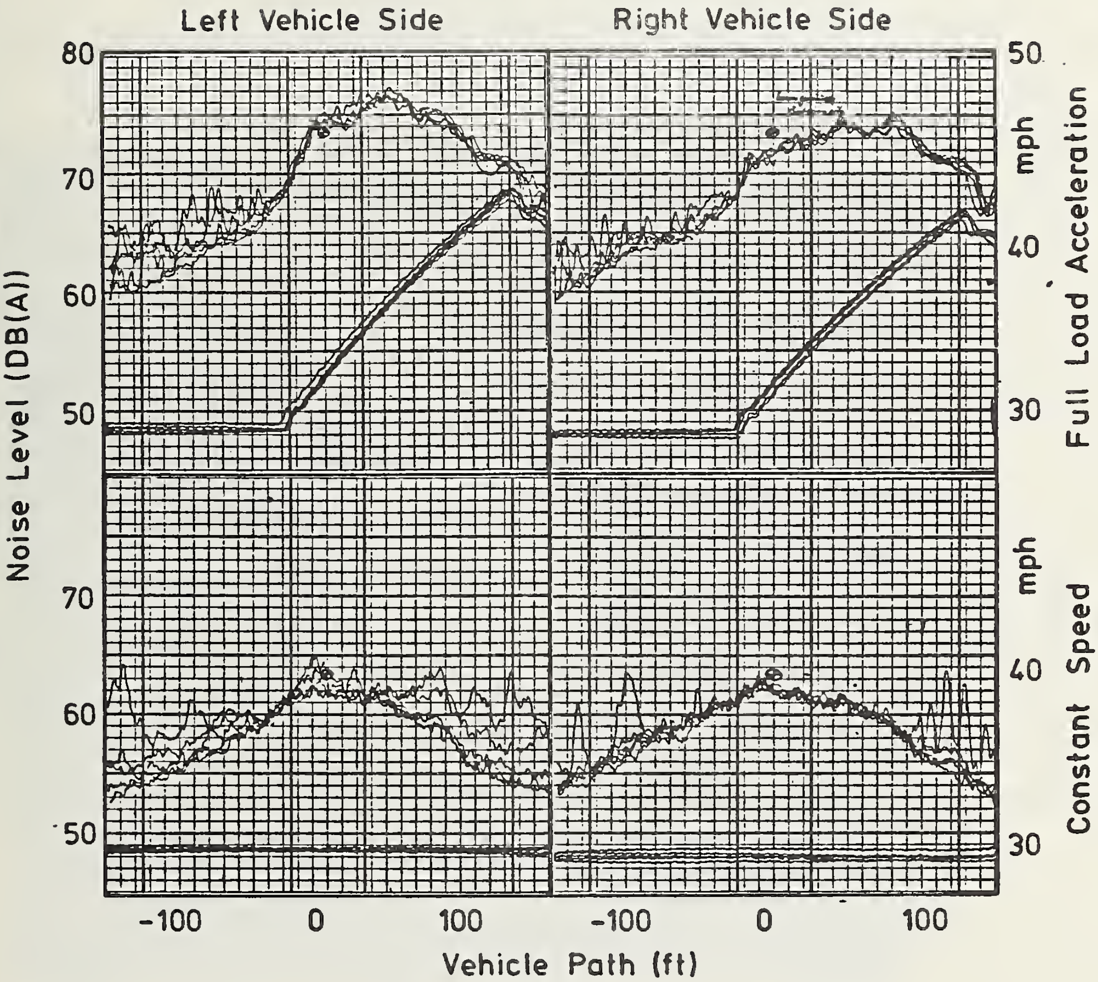
Idle Noise 81 dB(A) exterior
53.5 dB(A) interior



# NOISE EMISSION

GOLF GLD NO. 1 WITH 50 HP PRODUCTION DIESEL

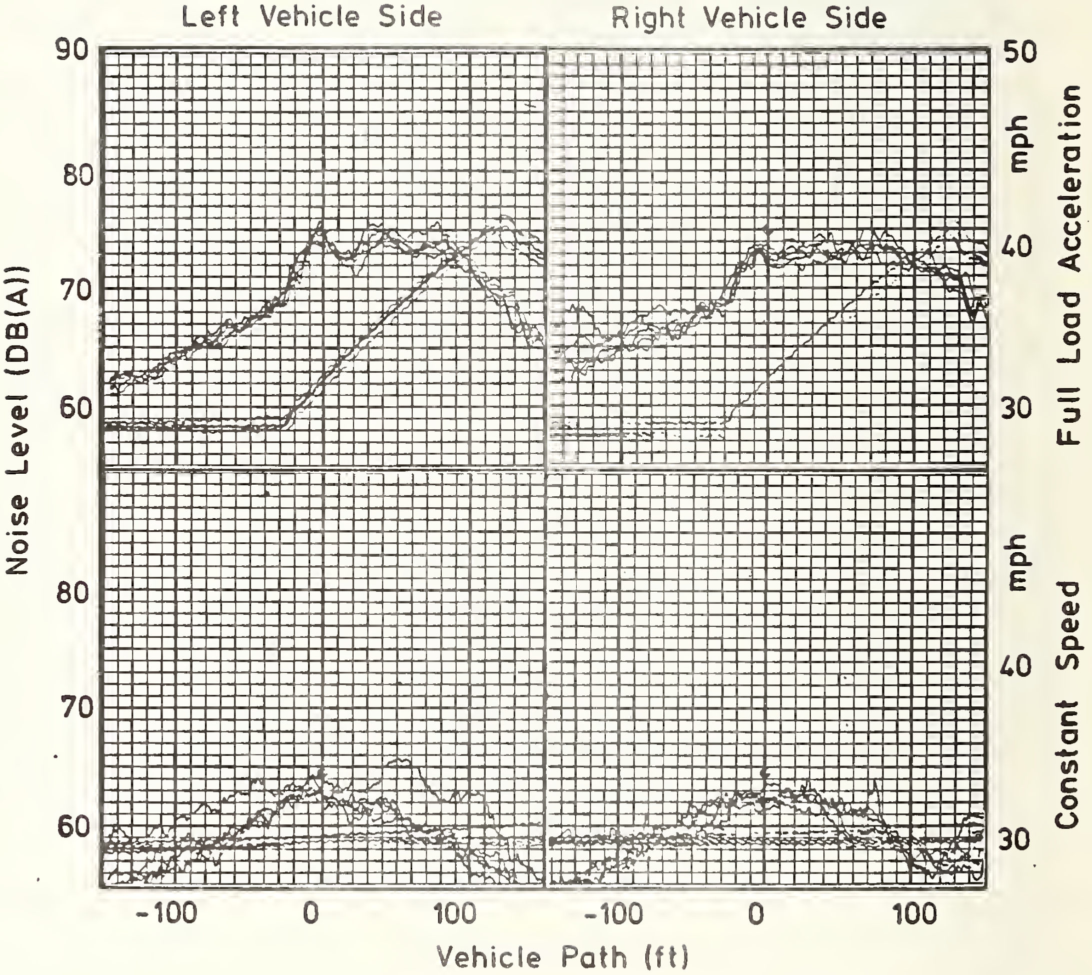
Idle Noise 78.5 dB(A) exterior



# NOISE EMISSION

GOLF GLD NO. 2 WITH 50 HP PRODUCTION DIESEL

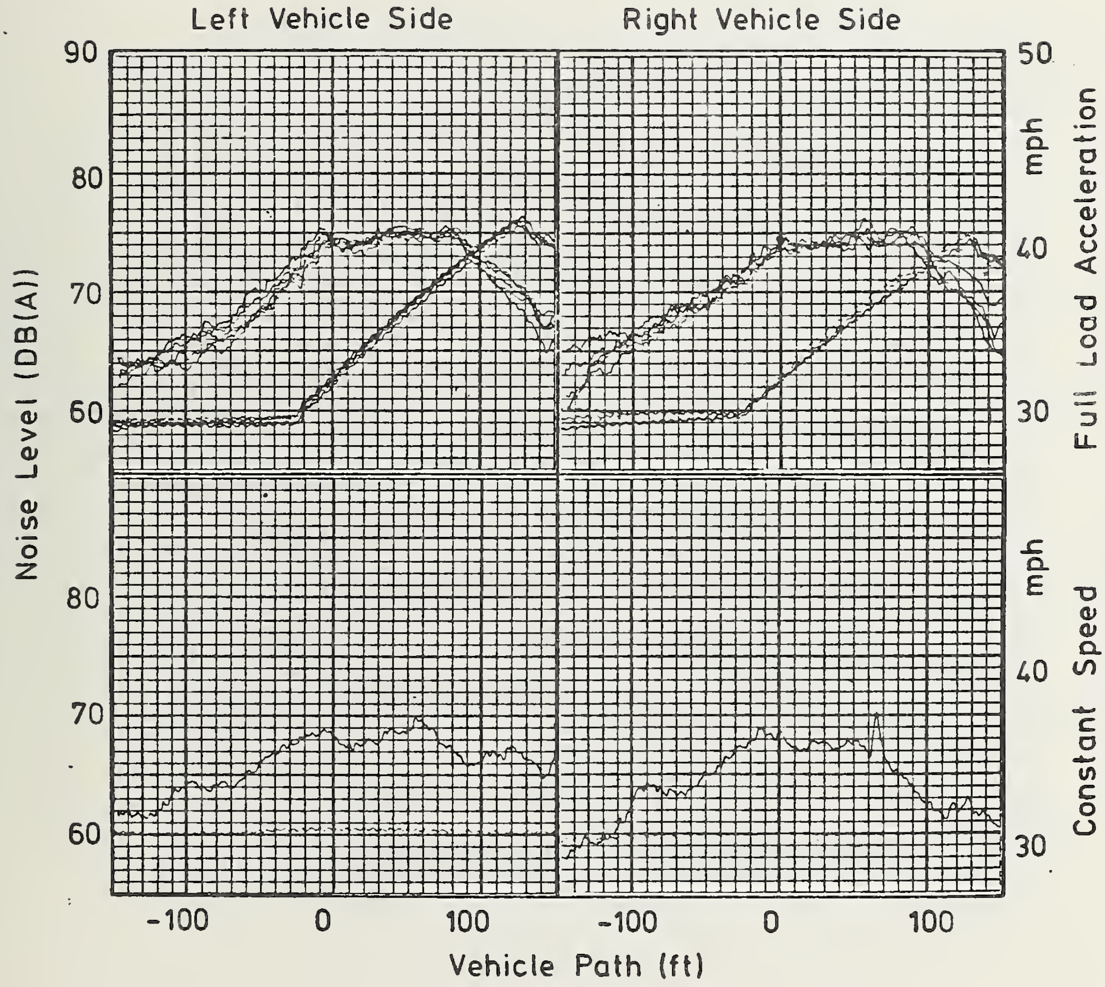
Idle Noise 83 dB(A) exterior
55.5 dB(A) interior



## NOISE EMISSION

GOLF GLD NO. 3 WITH 50 HP PRODUCTION DIESEL
on wet surface.

Idle Noise 80 dB(A) exterior
54 dB(A) interior

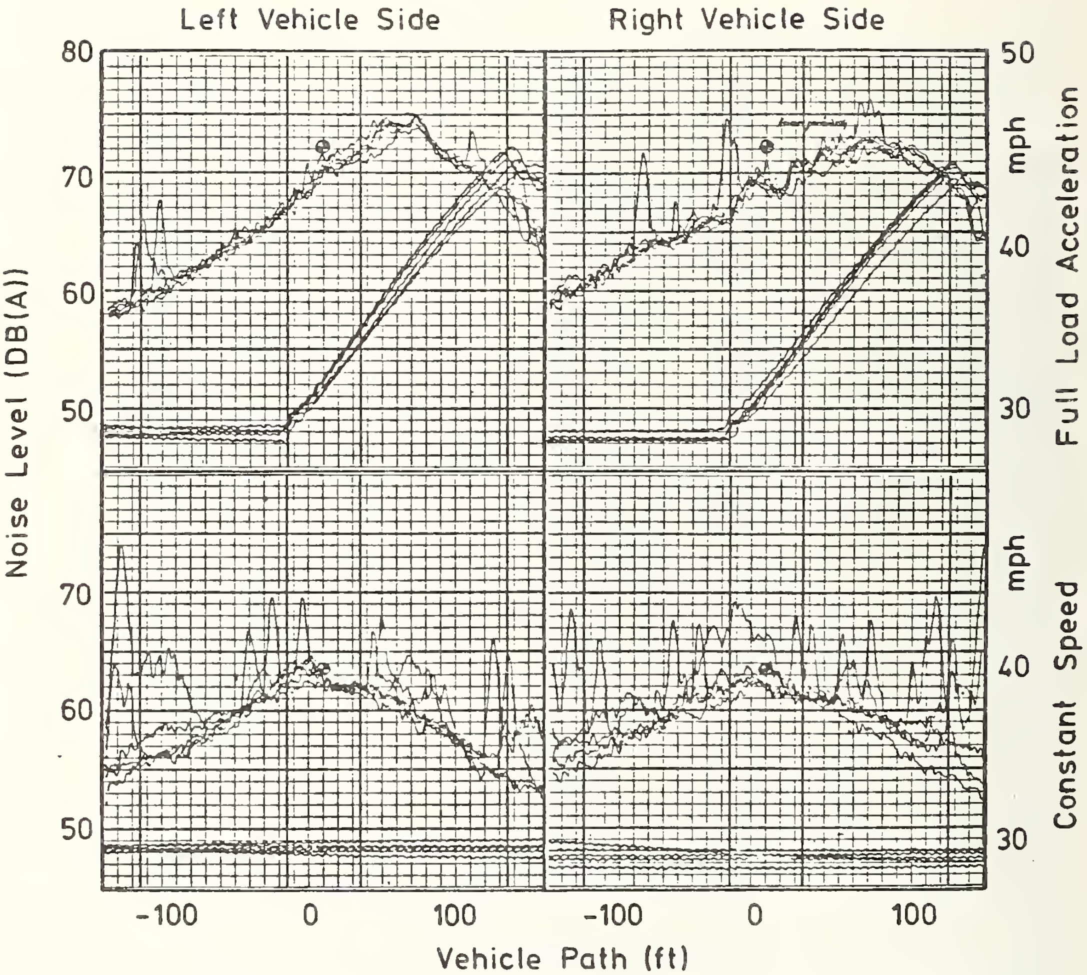


# NOISE EMISSION

GOLF LD WITH 70 HP TURBOCHARGED DIESEL

Gunfire background

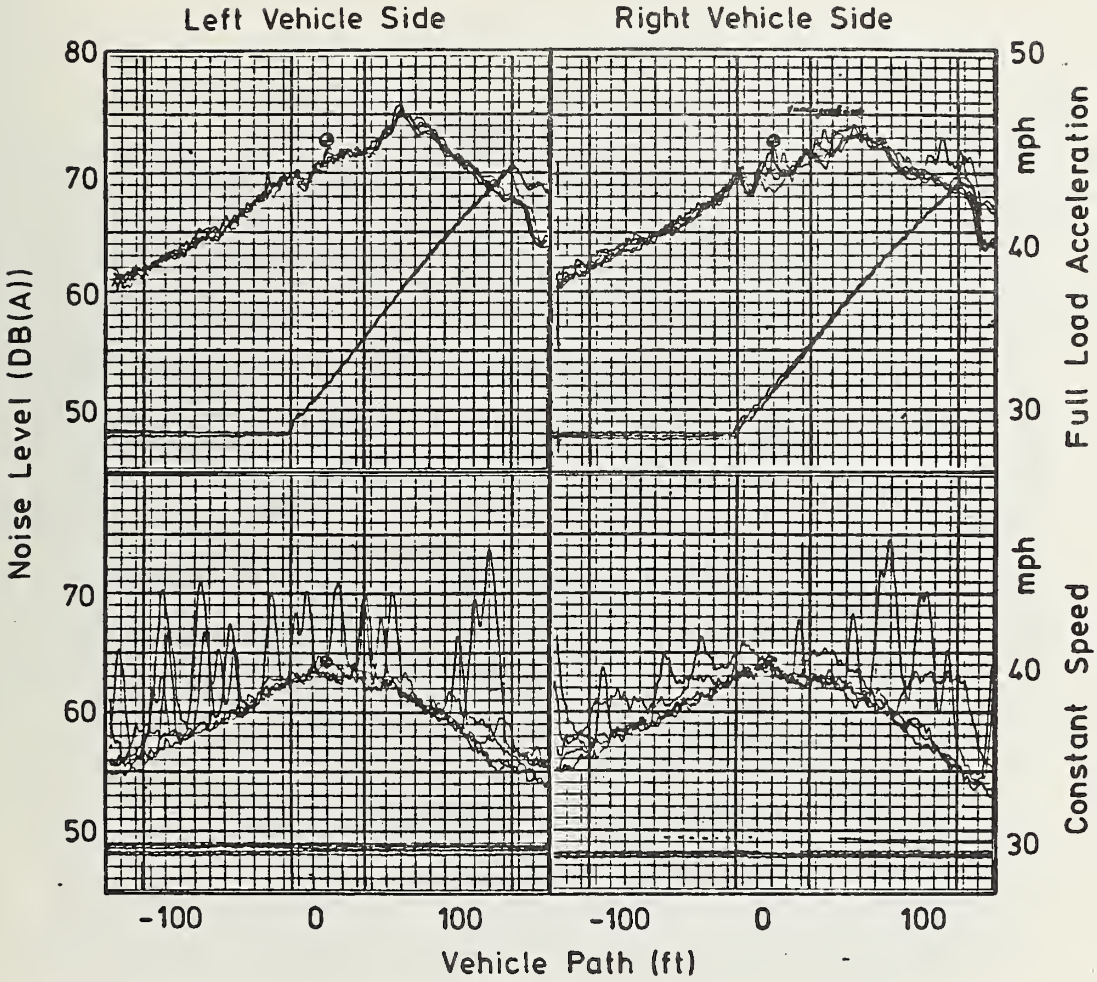
Idle Noise 79.5 dB(A) exterior



## NOISE EMISSION

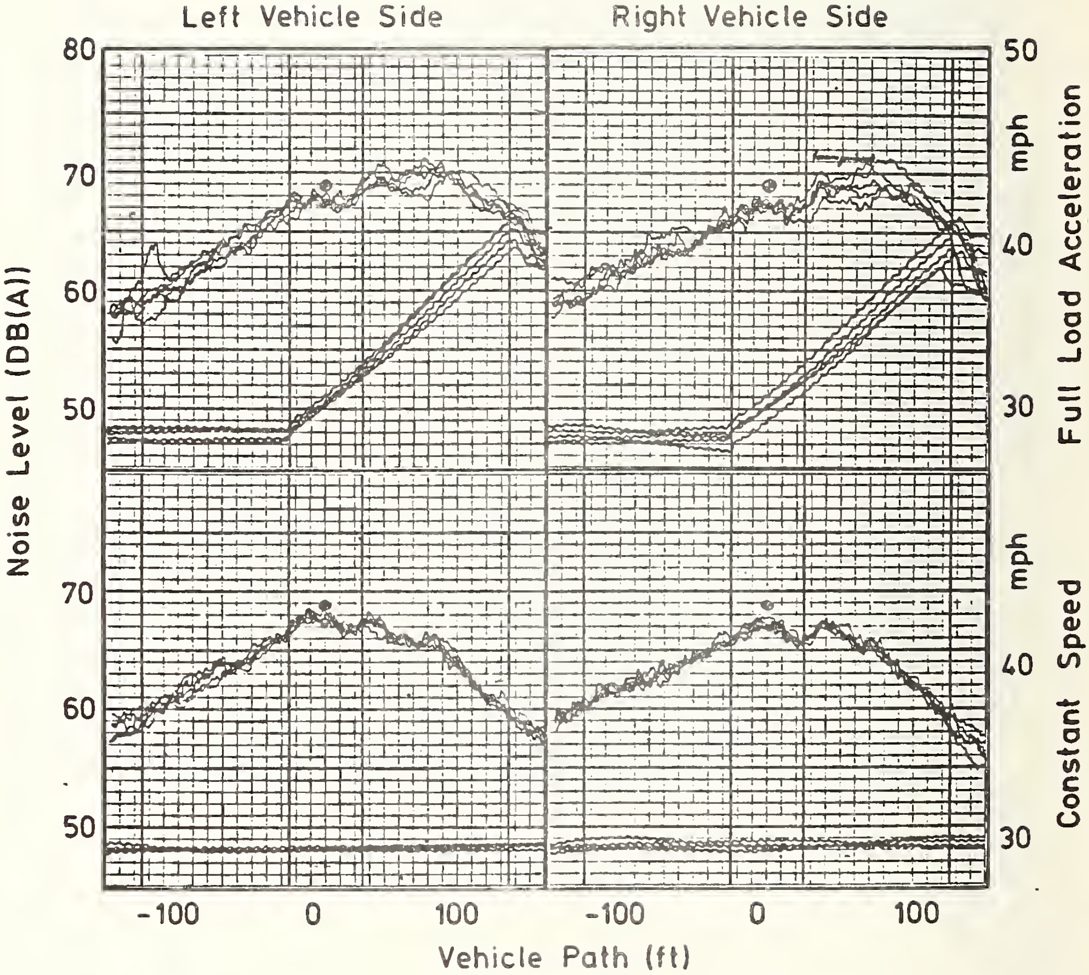
GOLF GLD WITH 70 HP TURBOCHARGED DIESEL
Gunfire background

Idle Noise 79.5 dB(A) exterior



# NOISE EMISSION

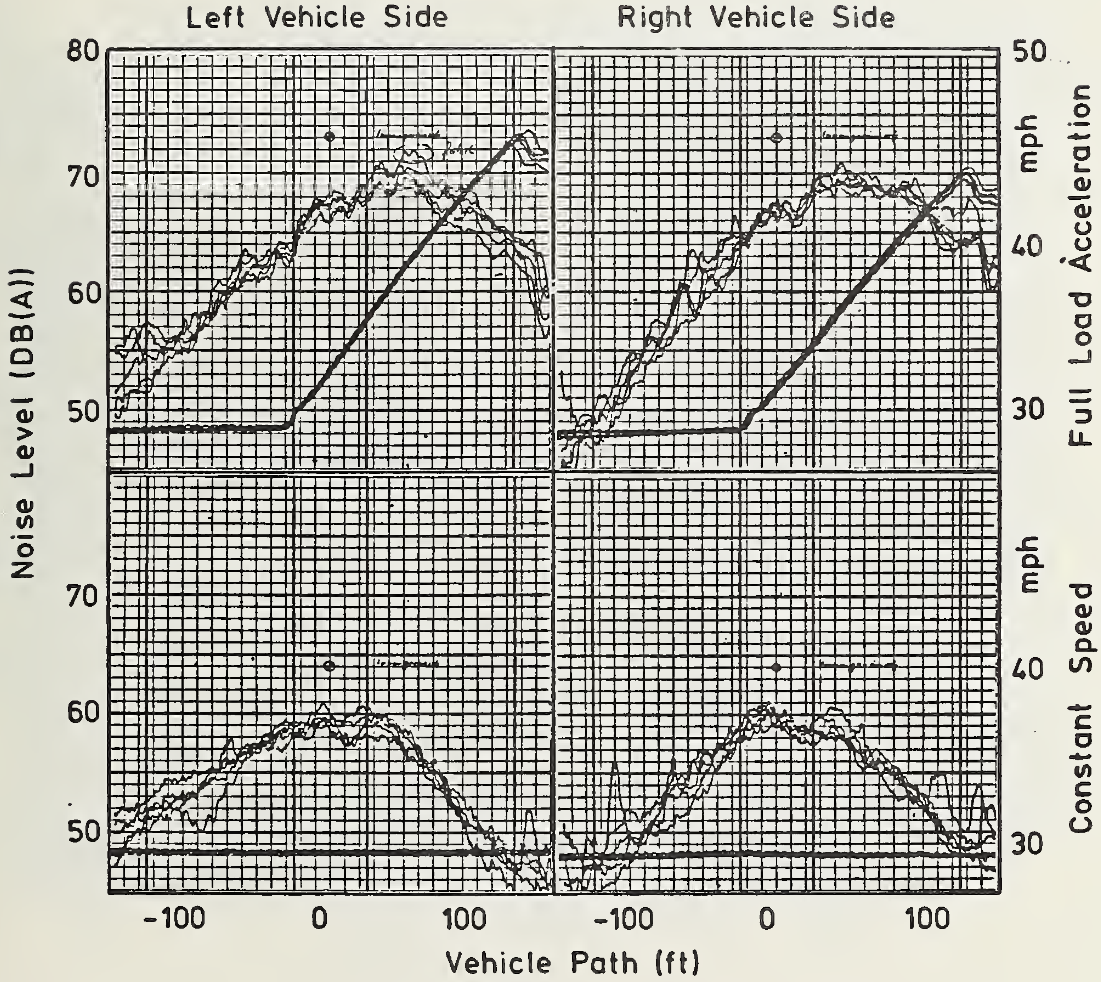
RABBIT D WITH 70 HP TURBOCHARGED DIESEL
30 mph cruise in 2 nd. gear.



# NOISE EMISSION

IRVW WITH 70 HP TURBOCHARGED DIESEL

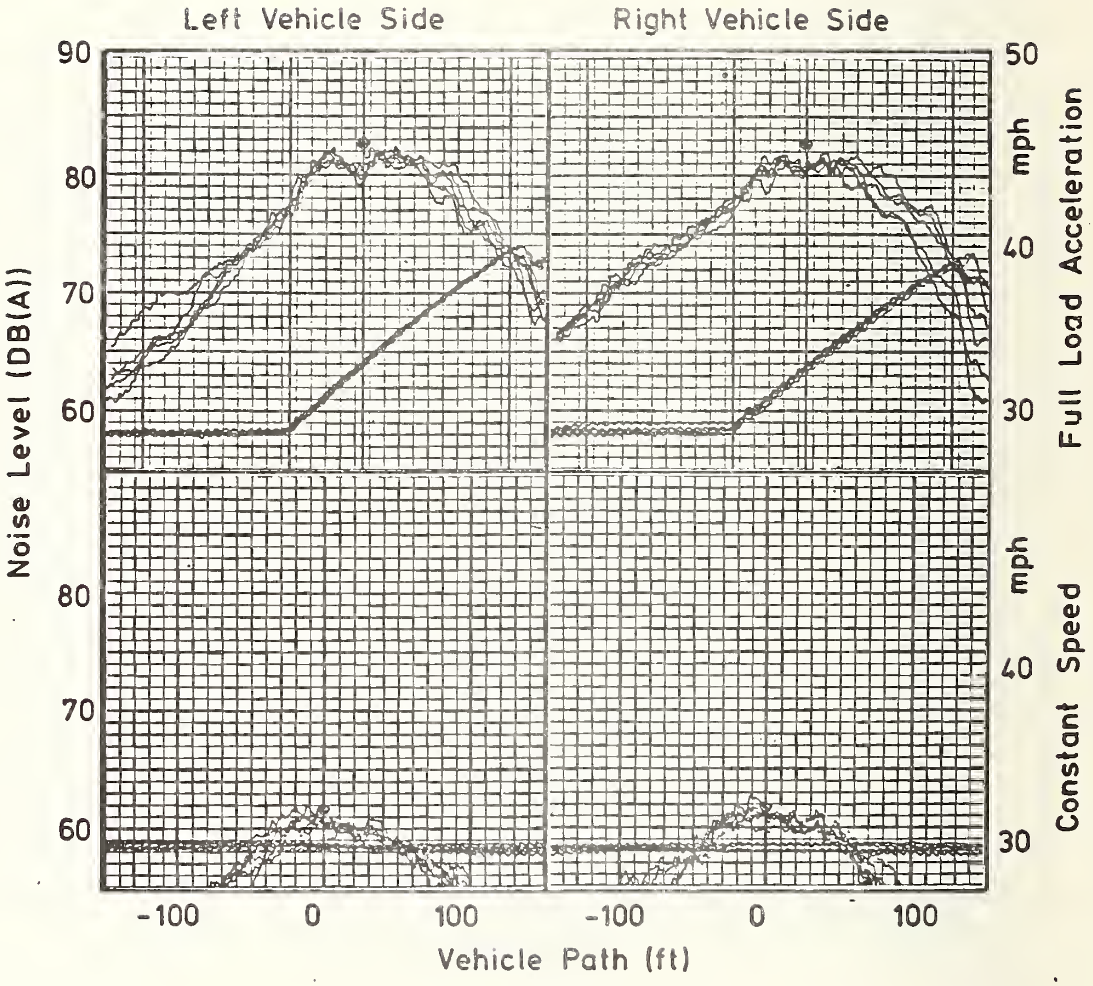
Idle Noise 74 dB(A) exterior
56 dB(A) interior



# NOISE EMISSION

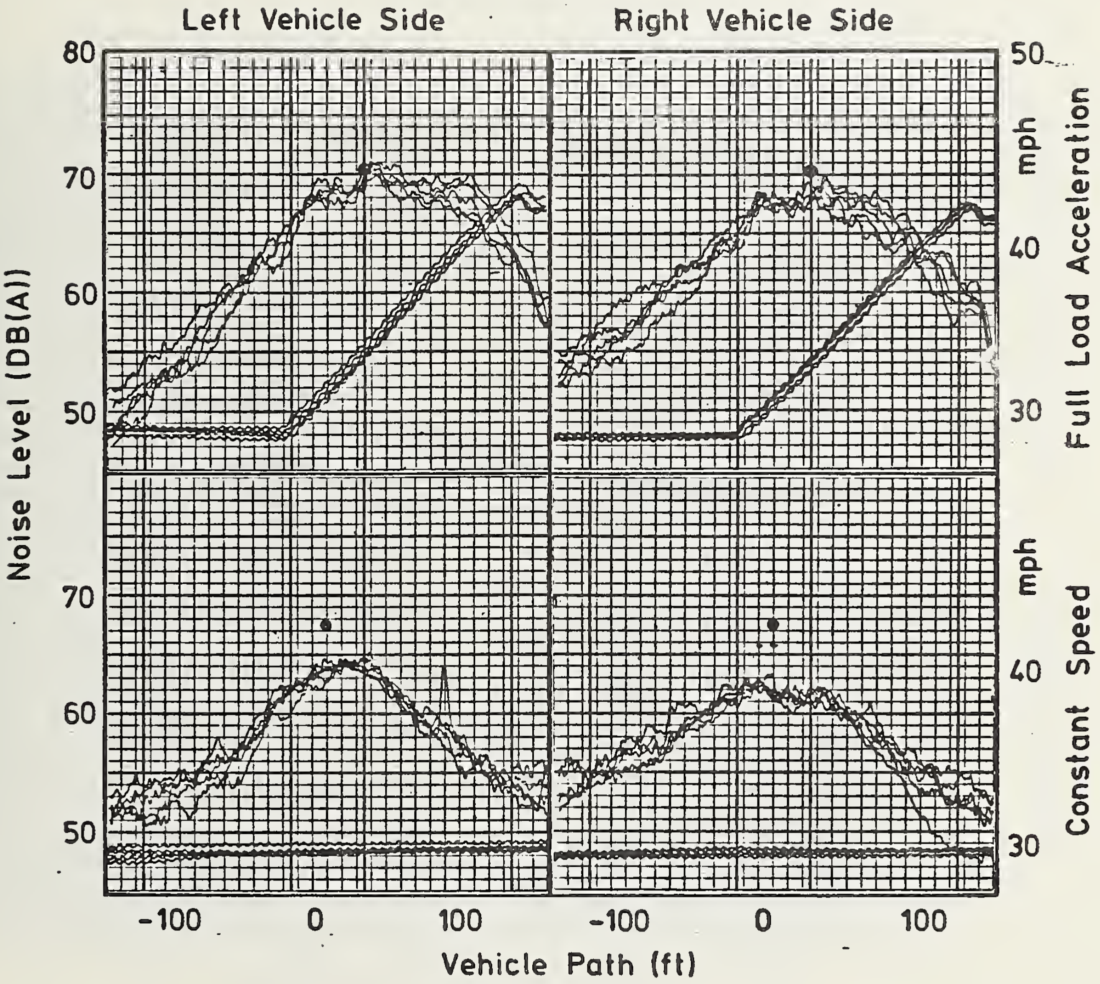
GOLF GLD WITH 50 HP N.A. E.G.R. DIESEL

Idle Noise 73 dB(A) exterior
51 dB(A) interior



# NOISE EMISSION

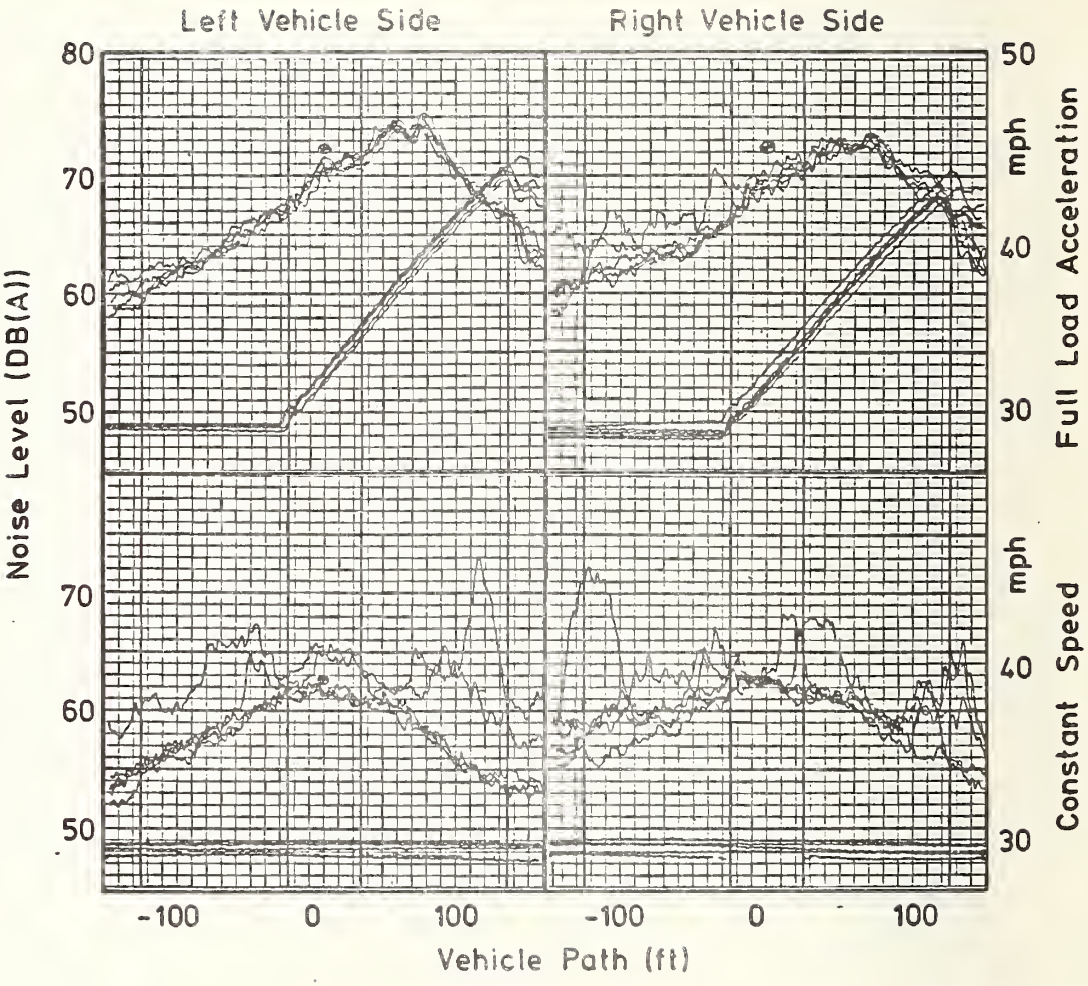
GOLF GLD WITH 70 HP TC E.G.R. DIESEL
Idle Noise 76 dB(A) exterior
54 dB(A) interior



# NOISE EMISSION

GOLF GLD WITH 70 HP TC $H_2O$ DIESEL

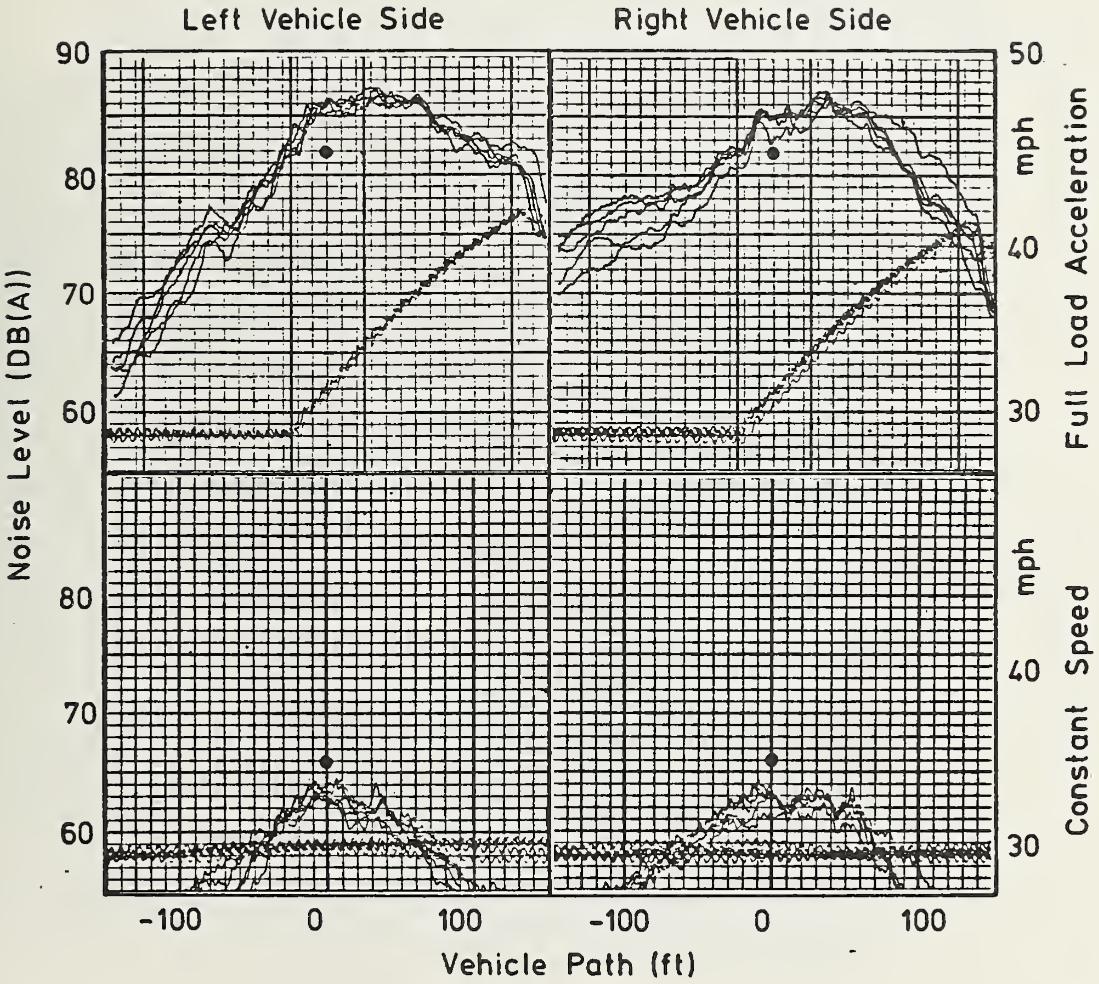
Idle Noise 81 dB(A) exterior



# NOISE EMISSION

AUDI 100 WITH 5 CYLINDER N.A. DIESEL

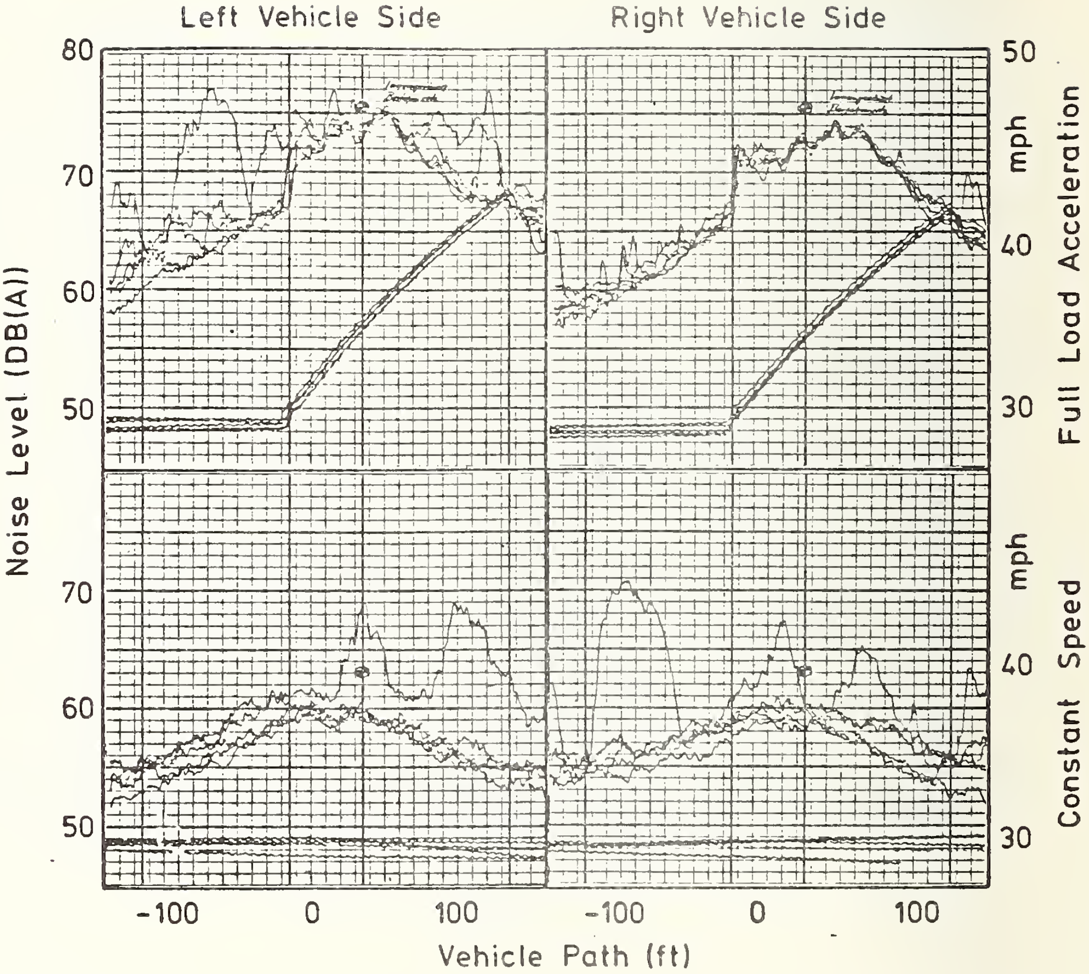
Idle Noise 75 dB(A) exterior
55.5 dB(A) interior



## NOISE EMISSION

GOLF WITH 50 HP GASOLINE ENGINE

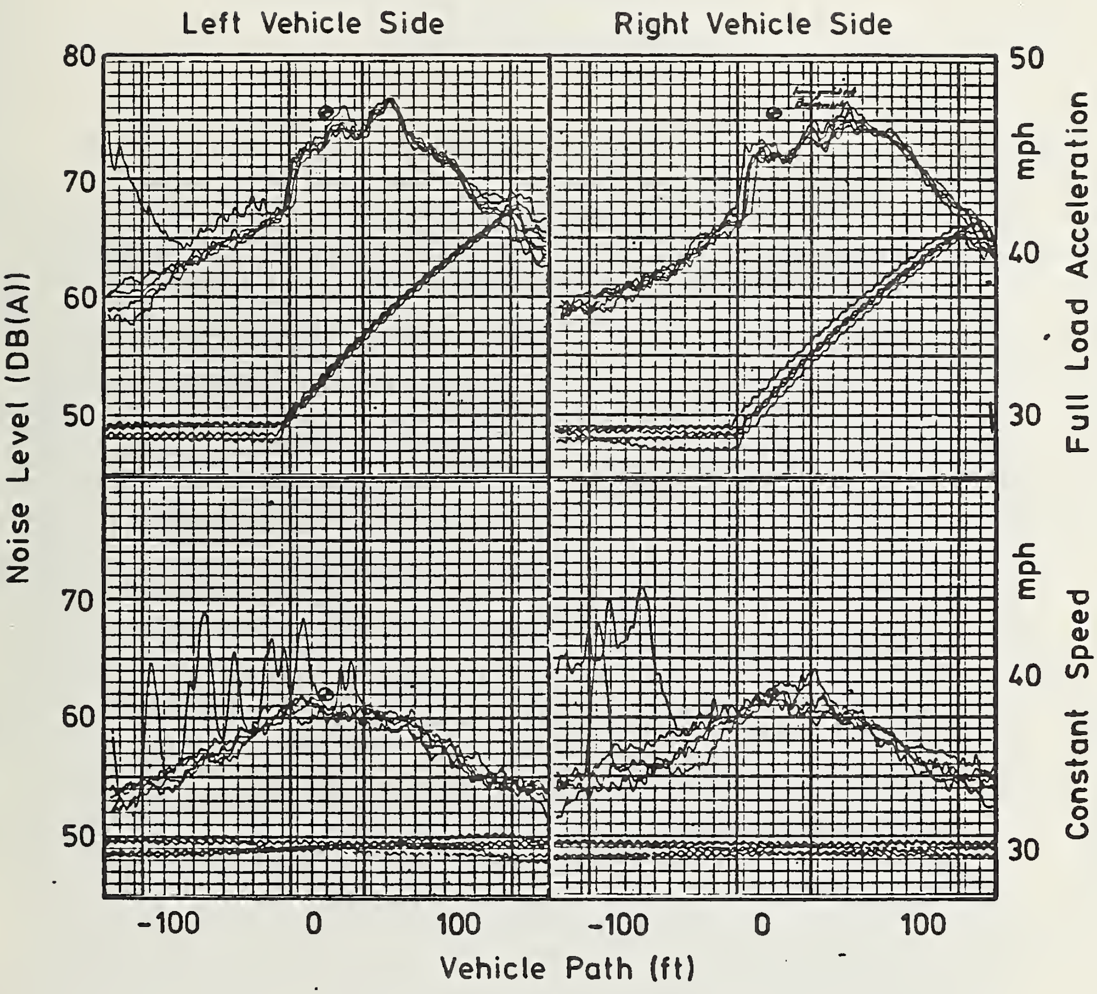
Idle Noise 74 dB(A) exterior



# NOISE EMISSION

GOLF L WITH 50 HP GASOLINE ENGINE

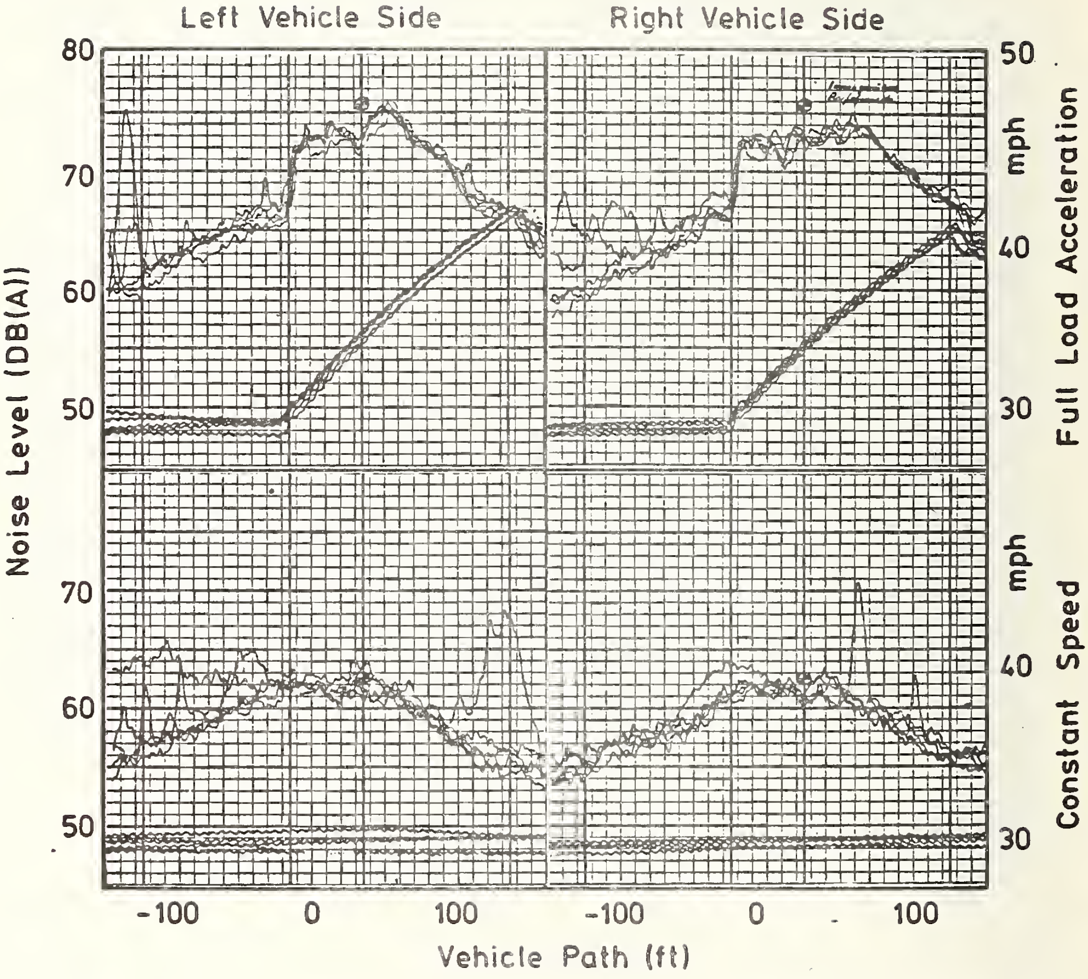
Idle Noise 71 dB(A) exterior



# NOISE EMISSION

GOLF GL NO. 1 WITH 50 HP GASOLINE ENGINE

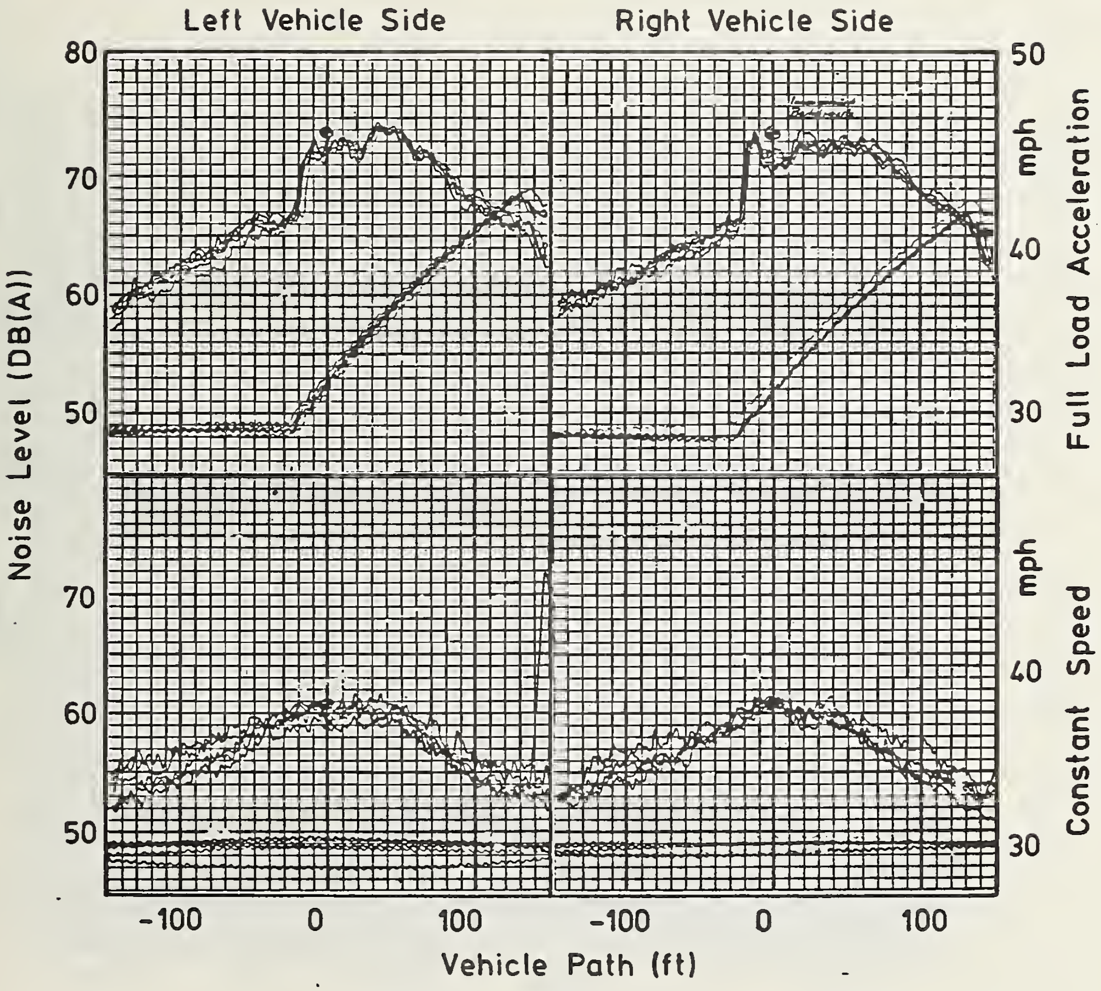
Idle Noise 76 dB(A) exterior



# NOISE EMISSION

GOLF GL NO. 2 WITH 50 HP GASOLINE ENGINE

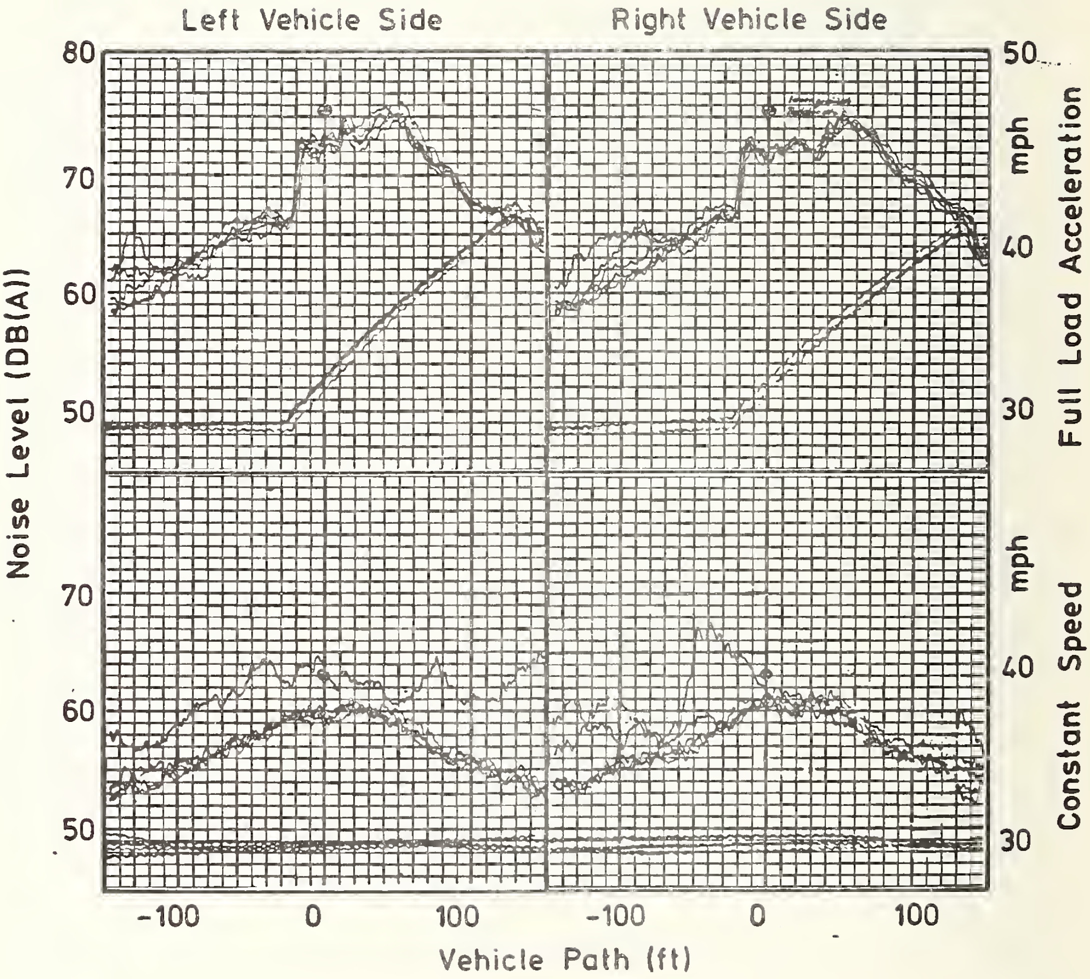
Idle Noise 75 dB(A) exterior



# NOISE EMISSION

GOLF GL NO. 3 WITH 50 HP GASOLINE ENGINE

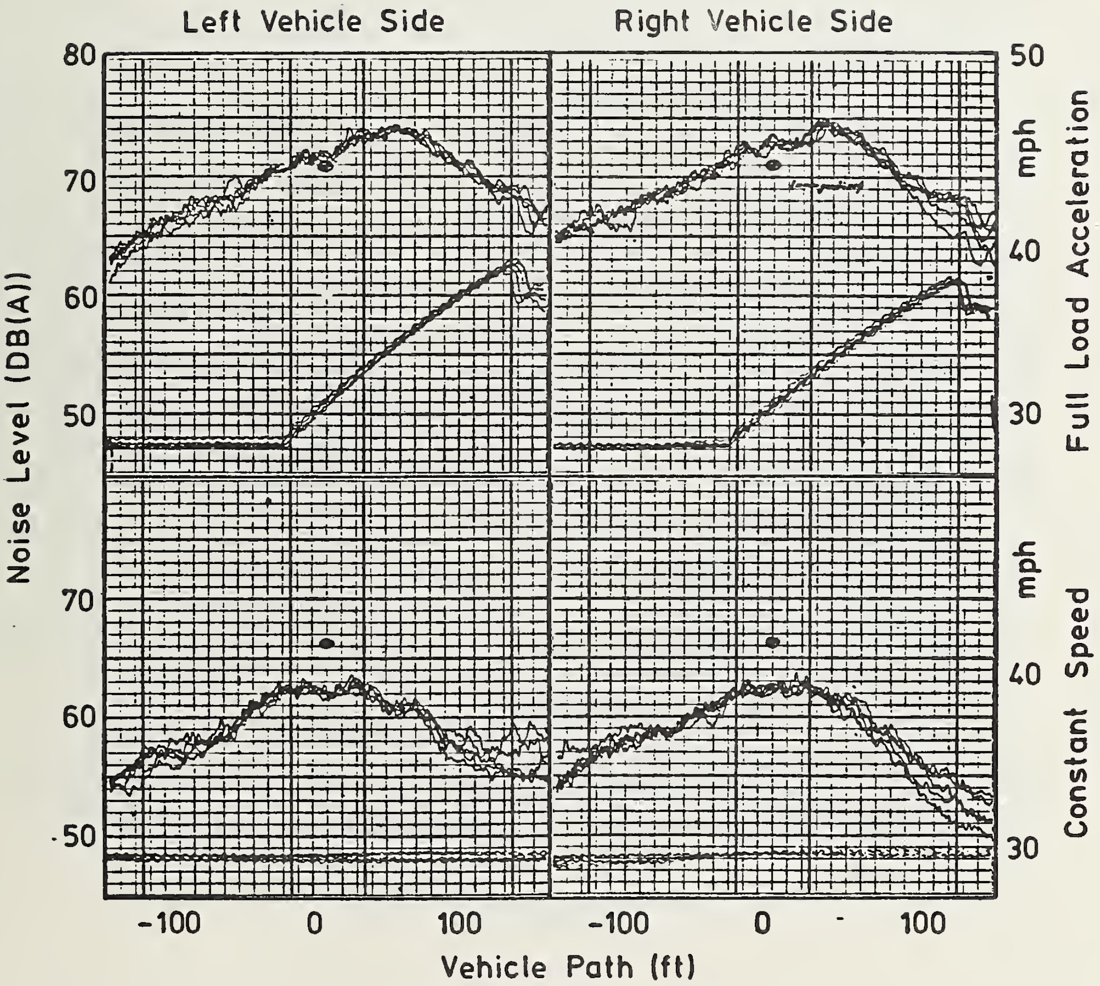
Idle Noise 75 dB(A) exterior



# NOISE EMISSION

OPEL D WITH 60 HP PRODUCTION DIESEL

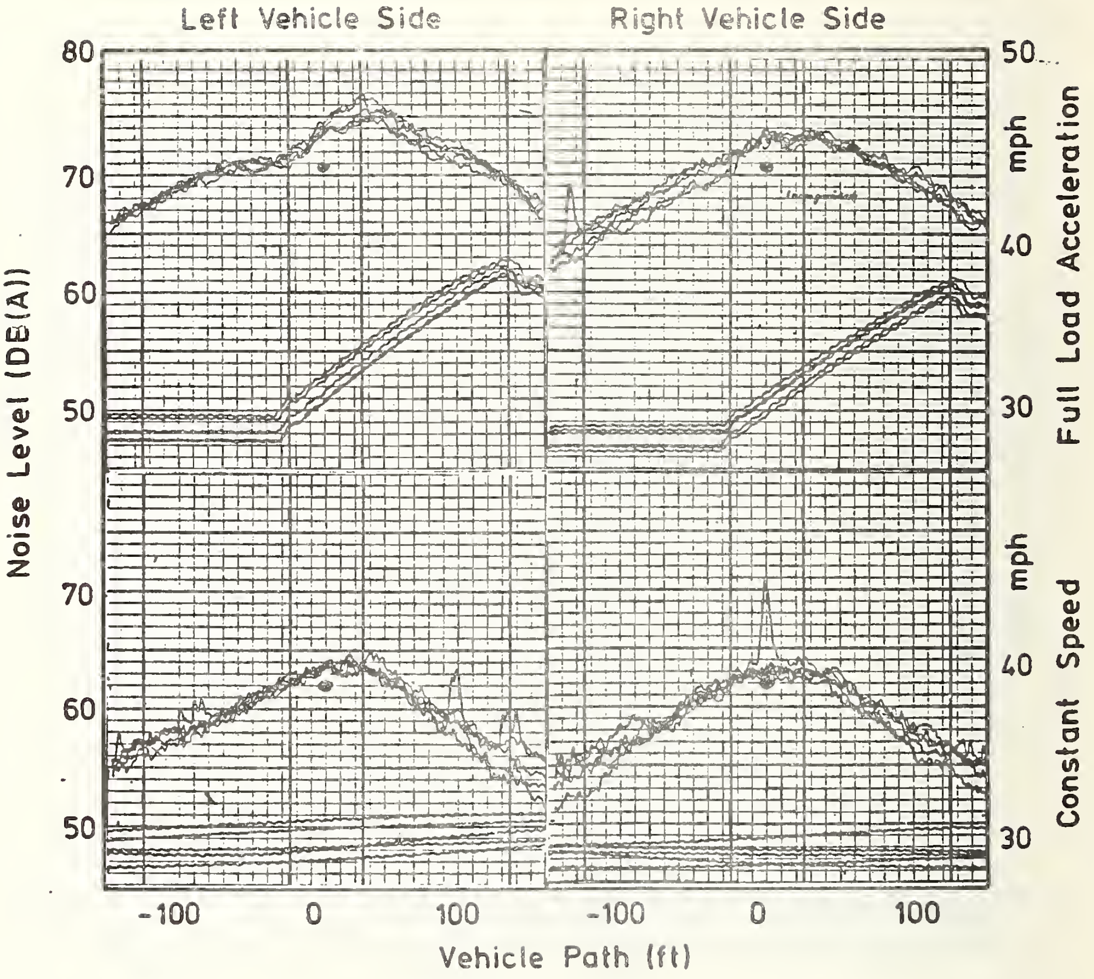
Idle Noise 83 dB(A) exterior



# NOISE EMISSION

PEUGEOT 504 WITH 65 HP PRODUCTION DIESEL

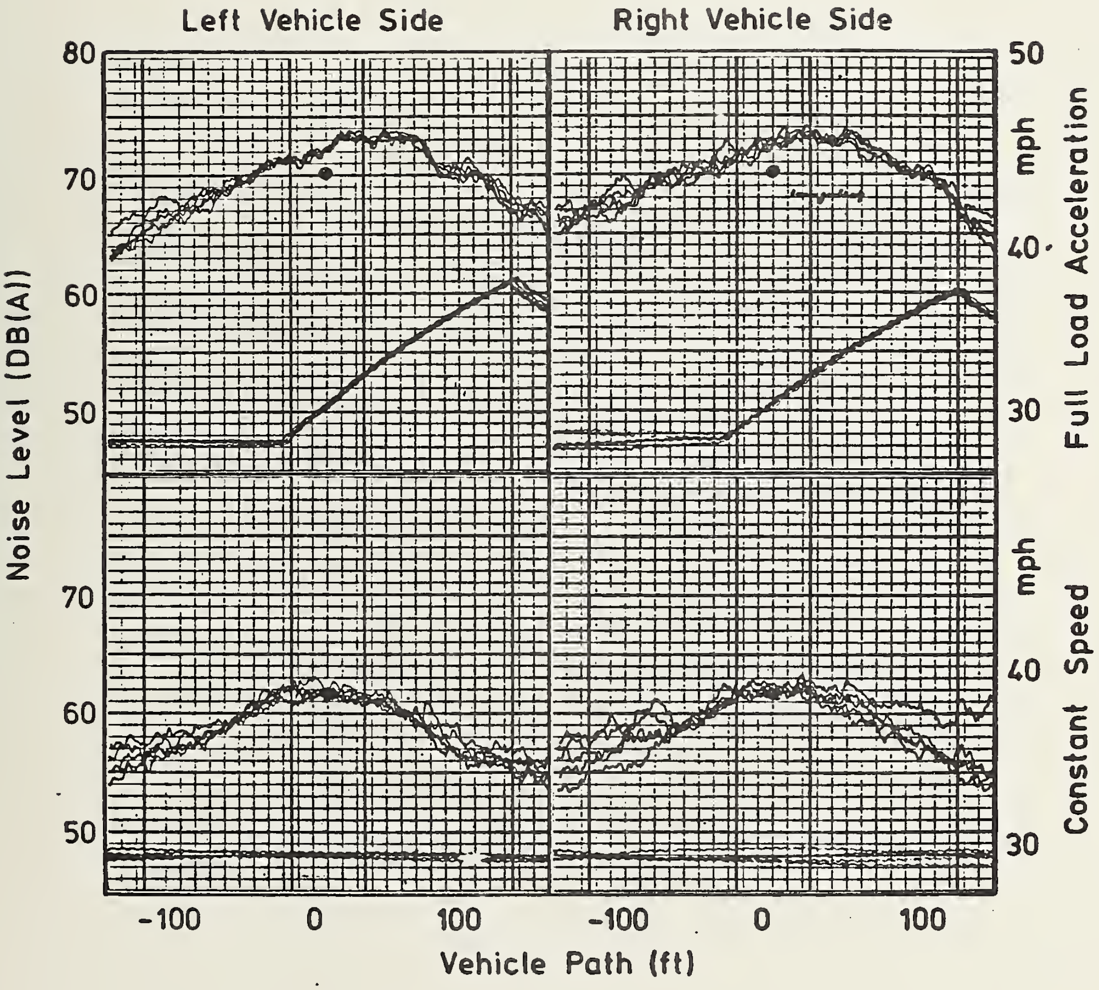
Idle Noise 80 dB(A) exterior



# NOISE EMISSION

MERCEDES 300 D WITH 80 HP PRODUCTION DIESEL
Automatic Transmission

Idle Noise 81 dB(A) exterior



# APPENDIX B

# REPORT OF NEW TECHNOLOGY

The work performed under this contract, while leading to no new inventions has provided a detailed characterization of the engines studied with emphasis on fuel economy, emissions and driveability.

HE 18.5 .A34 no. DOT- TSC
NHTSA-79-62 I-III v.3
Wiedemann, B.

Data base for light-weig
automotive diesel power

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